Air Conditioning Missiles at Canaveral . . . . . Pg. 18 Vandenberg . . . Pg. 28

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Chicagoans Push Plan for Separate Bids

CHICAGO—A brochure urging the letting of separate bids in each of the four categories of mechanical specialty work has been sent to every architect and consulting engineer in the Chicago area by the Coordinating Committee of the Mechanical Specialty Contractors Association of Chicago.

The brochure is the result of two years of cooperative work by representatives of the Ventilating & Air Conditioning Contractors Association of Chicago, the Plumbing Contractors Association of Chicago, the Mechanical Contractors Chicago Association, and the Electrical Contractors Association of the City of Chicago.

Its aim is to point out a practical way to end the unsavory practices of bid shopping and bid peddling and to reduce unreasonable costs in contract letting.

Now the Coordinating Committee is working on a second brochure, according to Henry J. Couch, executive secretary, to spell out in detail the items which belong in each of the four

(Continued on Page 33, Col. 3)

Some Areas Notice Late Sales Pick-up In Air Conditioners

DETROIT — "End-of-the-season" sales of air conditioners picked up somewhat in late August and early September, some spot reports indicate, but generally the tailing off of both manufacturer and retail sales which began in June continued through July and August, according to available information.

In room air conditioners, the July estimate of industry sales of such units by National Electrical Manufacturers Association was 113,500 units, a drop

(Continued on Page 33, Col. 3)

AGA States Position On Test Pressures

CLEVELAND — In response to a request by the Detroit Better Heating & Cooling Bureau that the American Gas Association change its standard testing pressure on furnaces of less than 100,000 Btuh from .12 and .15 in. static pressure water gauge to .20 in., Frank Hodgdon, director of AGA Laboratories, here, declared:

"We are very much interested in the recommendations made,

(Continued on Page 33, Col. 1)

Inside Dope

By GEORGE F. TAUBENECK

Learn to live and laugh — thus delay your epitaph

Harvard Professors Mislead the Public

Down through the ages aristocrats have tried to preserve their historical privileges by "rolling with the punches." (And who can blame them?)

Although publicly they may espouse the welfare of workingmen, and endure political fraternization with *hoi polloi* temporarily, they don this guise chiefly to maintain an illusion.

By seeming to be what they are not, they hope to keep what they have.

Thus the Landed Gentry have retained and enlarged their feudal estates in many countries while espousing "liberal" politicians and the latter's rabble-rousing platforms.

That term "Landed Gentry" is used advisedly.

In recent times the chief beneficiaries of so-called "liberal" inflationary policies have been real estate speculators, owners of huge farms, oilionnaires, and manipulators of enormous fortunes acquired before the Era of High Taxes.

It's Too Good for the Serfs

There's an old story about a Royal Princess who was thrilled during her wedding night.

"Can the peasants enjoy this sort of thing?" she queried her Royal Consort.

"Certainly," he testified, out of prior experience.

"It's too good for them. I'll forbid it when I become Queen."

This mythical aristocrat has Royal Successors in Harvard professors Arthur Schlesinger, Jr., and J. K. Galbraith. Winningly they rewrite the Ten Commandments ("Thou shalt not") for that left-wing splinter group, Americans for Democratic Action.

In a booklet entitled, "The Big Decision: Private Indulgence or National Power?" Schlesinger maintains that money spent by individuals in local stores hinders national progress.

Whether or not we should have freedom to buy, he con-

(Continued on Page 10, Col. 1)

Vital to Production, Storage, Launching, Tracking

Present Status of Missiles Unattainable Without Air Conditioning, Experts Say

INSIDE . . . . the Missile Issue

Air conditioning systems used in the missile program are in many instances complicated in their design, and in some applications have had to produce conditions that are rarely, if ever, called for in civilian applications. For this reason the editorial material in this issue might seem to be of primary interest to those concerned with the more advanced technological phases of air conditioning.

However, there is much to interest anyone who is concerned with the design and sale of air conditioning systems and components for same. Readers can check the following digest and index of principal stories as a guide to what may interest them.

1. At the MISSILE TEST CENTER at Cape Canaveral, air conditioning finds application not only in the missiles and their launch pads, but in such places as control centers, tightly sealed blockhouses, electronic tracking stations, and telemetry centers. There are many of these which now have, or will have, counterparts in the civilian market. (See page 18 and following).

2. In the "HARD BASE" (UNDERGROUND) FIRING SITES for missiles with warheads, special conditions are required. The conditions required are specified, and the story also includes the exact specifications of various components called for in the government contracts for these sites. (Page 28 and following).

3. TECH CENTER this issue discusses advances made towards developing an all-aluminum air conditioning system, which the military finds desirable in certain applications. (Pages 12 and 13).

4. There can be no margin for error in the SPACE CAPSULES in which the American astronauts will go into orbital flight and return safely to earth. These capsules are assembled in areas having a high degree of environmental perfection, and where dust is filtered out down to .3 of a micron. How this is done is told on pages 8 and 9.

5. In some of the applications for the missile program, air conditioning is supplied from TRAILER-MOUNTED UNITS. How they operate is described on pages 32 and 35.

6. NUCLEAR MISSILE-FIRING SUBMARINES capable of remaining submerged for weeks find air conditioning an absolute necessity to cool, dehumidify, and purify air. The machinery also must be vibrationless to prevent detection by enemy listening devices. An adaptation of a steam activated absorption refrigerating machine designed particularly for submarine service is pictured on page 34.

●

ICBM MISSILES when being readied for firing require air conditioning of the missile structure. Flexible ducts connected to the Titan supply air at 15% r.h. and various temperatures. Guidance bay gets 30°F air; 70° air goes to telemetry bay, and the sustainer (second stage) engine requires 120° until the missile is actually launched.

"HARD BASE" missile site, from which missiles to deter an attacking enemy will be fired, has entire launch complex underground. Missile is raised from covered 140-ft. silo (as it is being raised in this photograph) for firing. Air conditioning has important role in conditioning both manned and unmanned parts of the underground launch complex as well as the missile itself.

DETROIT—The air conditioning industry can be proud of the part that it plays in the U.S. missile program. There are some missilemen who will venture the opinion that without air conditioning it might be impossible to launch certain missiles now vital to our national defense.

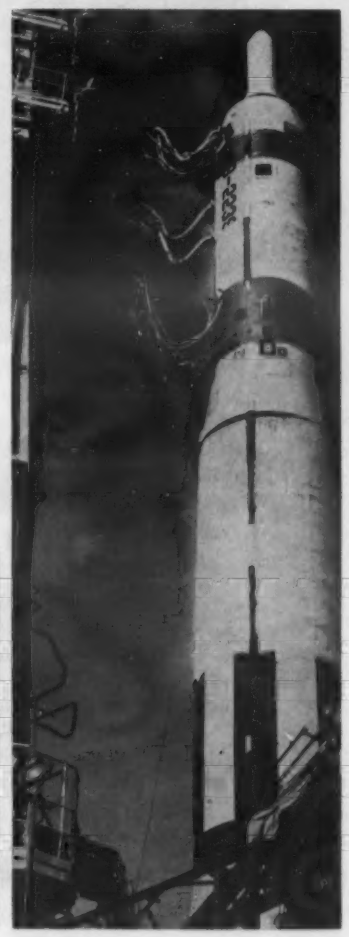
All of those knowledgeable in the field would testify that without air conditioning it would not have been possible to have brought the missile program to its present state of accomplishment.

Further, the industry's contribution was not merely that of supplying standard systems and components that would function reliably to provide standard conditions.

Engineering talent in the factory and in the field were pressed to develop systems to provide a range of temperature and humidity conditions and air velocities within time limitations, to a degree never found in the most complicated process applications in civilian life.

The reports in this issue describe in some detail (within

(Continued on Back Page, Col. 1)



In the Heating Field

Detroit Reciprocal Code Flushes Out 'Bootleg' Contractors, Pontiac Finds

PONTIAC, Mich. — An eye-opening revelation of how much heating work is done by "bootleg" contractors who fail to take out city permits was indicated in a report made by Peter Hickey, Pontiac heating inspector.

Testifying to the advantages that the city of Pontiac has received from joining the Reciprocal Heating Council—organization of Detroit area communities using the same heating code and permitting contractors licensed by any one member community to do work in any other community by merely registering his license there—Hodges cited figures from his cash book, comparing the first four months of 1959 with the first four months of 1960.

In 1959, before Pontiac belonged to the Council, the cash book showed 156 permits totaling $1,060. The following year, after joining the Council, the cash book showed 898 permits totaling $5,693.

"This is a difference of 743 permits for the same period of time," Hickey said, "which shows the amount of work that was done without permit or inspection, oftentimes by persons not qualified."

Hickey said, "the advantages of the Reciprocal Heating Council are twofold. First to the general public, in the matter of public health and safety and assurance of good workmanship.

"Second, increased revenue to the city as a result of all contractors being licensed and 'bootleggers' flushed out, and with increased revenue, inspection that will insure good workmanship.

"In the past, too many installations were made without permits by friends of homeowners or contractor's helpers out to make a little money on the side. Reciprocal Heating has put a stop to all this.

"It has also been an aid to those contractors who are truly qualified to give the public the best service and rids the trade of those who prey on the public and give poor workmanship and undercut the contractor's prices."

CRAC Reports Refrigeration, Cooling Volume Up Despite Building Slump

LOS ANGELES—Despite the decrease in the Los Angeles area of construction during the first six months of 1960, the refrigeration and air conditioning industry reported a sharp increase in activity over the same period for last year.

According to L. P. Jacobsen, chairman of the Certified Refrigeration & Air Conditioning Foundation (CRAC), the number of man hours for the refrigeration and air conditioning industry was 17% higher for the first six months of 1960 than for the same period of 1959.

This is in contrast to the 1% decrease reported by the construction industry for the first half of 1960, it was pointed out.

"We estimate that approximately one-half of this was due to normal developing conditions, but approximately one-half must be laid to the continued program of the Certified Refrigeration & Air Conditioning Foundation in pointing out the benefits and advantages of air conditioning and refrigeration," stated Jacobsen.

He predicted that the increase in activity for the refrigeration and air conditioning industry in Southern California would continue indefinitely. He added that the industry is now meeting the demands for skilled service and installation personnel through specialized journeymen and apprentice training programs sponsored by CRAC.

3 to 70 TONS—HORIZONTAL or VERTICAL FACE

The low, slim-trim lines of the new Kramer air-cooled UNICON-COMPRESSOR give it unequaled flexibility in any architectural setting. Space saving outdoor design and low, low operating weight combine to reduce structural and engineering problems. Easy and economical to install, the complete packaged UNICON-COMPRESSOR has matchless accessibility for servicing. Its corrosion resistant aluminum casing, and its frame galvanized after fabrication, eliminate painting maintenance.

And remember—no place in the U. S. A. is too hot (or too cold) for the UNICON-COMPRESSOR. With the patented Kramer Winterstat it will operate any time of the year, without adjustment, even in the dead of winter.

Write for bulletin C460B.

KRAMER TRENTON CO., Trenton 5, N. J.

47 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

July Distributor Sales Up 6% Over Last Year

WASHINGTON, D. C.—July sales of air conditioning and commercial refrigeration equipment distributors rose an average of 6% from a year earlier and were off 3% from June, according to the Bureau of the Census.

For the first seven months of the year, the distributors' sales were 16% above those for the corresponding period of 1959. Their inventories at the end of July were 5% higher than a year earlier and 2% lower than a month earlier.

Sales of plumbing and heating equipment and supplies distributors in July were reported off 11% from July, 1959, and down 7% from June. First-seven-month sales declined 1% compared with the like-year-ago period. The distributors' inventories on July 31 were up 3% from a year ago and unchanged from the end of June.

Arthur Cutts Willard, Founder of NWAHACA Research Program, Dies

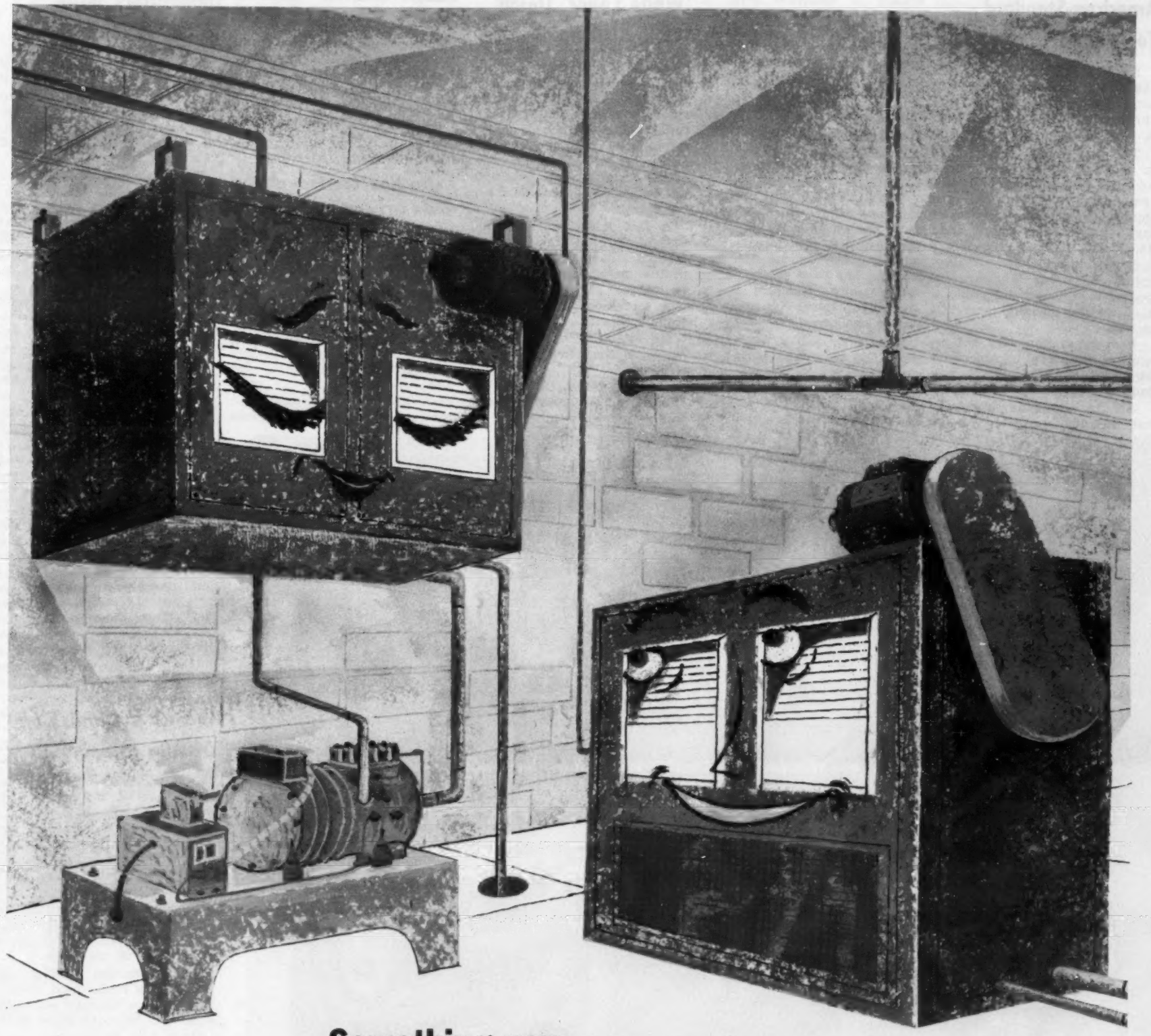
CHAMPAIGN, Ill. — Arthur Cutts Willard, president emeritus of the University of Illinois and founder of the National Warm Air Heating & Air Conditioning Association's research program, died Sept. 11.

President Willard was Dean of the university's Engineering School for many years prior to becoming president.

Heating and ventilating were his specialties, and he built up that department in his school to a point where it graduated an extraordinary proportion of the engineers now working in the air conditioning and heating industry.

ASHRAE, NWAHACA, I-B-R, and other industry associations have supported research programs at the University of Illinois as a result of his leadership.

Two years ago, in Chicago, ASHRAE tendered him a testimonial dinner on the occasion of his retirement from the university.



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Now, Air Handlers from Halstead & Mitchell in 880 to 47,500 CFM Range

AH Series Air Handling Units

Halstead & Mitchell

Before you buy any Air Handler, check and compare these new H&M units, feature for feature and price for price.

See how easily H&M Air Handlers accommodate matching cooling and heating coils, with space for up to 12 rows of coil depth overall! If you like, H&M coils (from 2 to 68 square feet of face area) can be factory-installed, leaving protruding connections on either side for easy hook-up. Halstead & Mitchell makes the coils you need to match: direct expansion, chilled water, hot water, standard or non-freeze steam. Filter sections are also available.

Performance? H&M Air Handlers deliver air against static loads up to 2-inches water gauge, and do it quietly.

Construction? They're the sturdiest units in the field. Forward curved centrifugal blowers are enclosed in a heavy gauge cabinet featuring formed steel corner posts and flush mounted panels.

Price? Just ask your H&M distributor. You'll be pleased. He has all the engineering information, too. Or, you can write for Bulletin AHU-100, Halstead & Mitchell, Bessemer Building, Pittsburgh, Pa.

Air Handlers • Finned Coils • Air-Cooled Condensers • Cooling Towers • Water-Cooled Condensers

American-Standard To Acquire Gauge Mfr.

NEW YORK CITY — American-Standard has contracted to acquire Rochester Mfg. Co. through an exchange of stock, it was reported here recently.

The latter firm, with plants in Rochester, N. Y., Chicago, and Los Angeles, manufactures temperature, pressure, and liquid level gauges. Its sales last year totaled more than $4,500,000.

Stockholders of family-owned Rochester Mfg. are expected to vote on the proposal at a special meeting later this month.

The transaction does not require the approval of American-Standard stockholders, it was indicated.

Acquisition plans reportedly call for the expansion of the Rochester plant and for the inclusion of Rochester Mfg. in American - Standard's Detroit Controls Div. Clark L. Hastings, Rochester Mfg. president, is expected to be named soon as vice president of Detroit Controls.

Kwajalein Missile Base Gets Boiler

DETROIT — A low pressure Kewanee boiler, which will provide process steam necessary for operation of a missile base on Kwajalein in the Marshall Islands, has been shipped from the American-Standard Industrial Div. plant at Kewanee, Ill., it was announced here.

The boiler has a net rating of 28,580 sq ft and a certified output of 261 hp. It was built for installation at U. S. Nike-Zeus missile facilities designed for naval support activity in the Pacific.

'White Collar' Union Wins Airtemp Election

DAYTON, Sept. 15—Certain clerical and technical employes of Airtemp Div., Chrysler Corp., voted to affiliate with a "white collar" union branch of the International Union of Electrical, Radio & Machine Workers (IUE) in a National Labor Relations Board election held here yesterday.

In the clerical workers' unit, 124 of 207 of those voting, favored joining the union, while in the technical workers' unit, 79 out of 113 voted to affiliate with the union, according to the announcement.

No executive or supervisory employes were involved in the election.

A union representative said clerical and technical employes would become members of the Professional, Technical & Salaried Conference Board of the IUE.

In recent previous efforts to unionize white collar workers in the Dayton area, the union had been successful with a technical unit of Leland Airborne Products but lost at Frigidaire Div., General Motors Corp.

D. C. Steamfitters Get Extra Pay for Travel

WASHINGTON, D. C.— Under a new three-year agreement signed here recently, members of the Mechanical Contractors Association will pay steamfitters travel pay instead of carfare.

Steamfitters working 20 miles beyond a central starting point will be paid at one hourly rate and those working over 40 miles away will get 25 cents more an hour. Previously, the contractors paid carfare from the district line.

Steamfitters Settle To End N. Y. Strike

NEW YORK CITY—Members of Steamfitters Local 638 voted recently at a special meeting to accept terms of a new three-year contract with the Mechanical Contractors Association of New York.

The action ended a strike which began July 1. The walk-out of some 4,000 steamfitters, together with a strike of sheet metal workers, had shut off work on large air conditioning systems in the New York City area.

Terms of the new contract provide wage and fringe benefit increases but, with one exception, do not include any requested reforms in work practices, such as current requirements to have men in units of two and refusal to use pipe cutting and threading machinery on the job, it was reported.

The one change provides that on a job where eight or more units are working overtime, the job steward shall be included in one of the units working overtime.

The sheet metal workers agreed earlier to terms for a new three-year contract in negotiations with the Sheet Metal Contractors and Mechanical Contractors associations. Several other construction unions also had been on strike since the first of July.

Gemco Expands Hupp's Missile Business

CLEVELAND — Hupp Corp. has expanded its missile and aviation activities through the acquisition of Gemco, Inc., Los Angeles, a pioneer in the field of ejection and separation systems, John O. Ekblom, Hupp chairman, announced.

Gemco also makes missile and aircraft ground handling equipment, hydraulic components, and electronic materials.

The acquisition, Ekblom said, involves an undisclosed amount of cash plus issuance of 20,000 shares of Hupp treasury stock. Gemco will be operated as a wholly-owned Hupp subsidiary under present management, he said.

Filter Use In Missile Industry Described

SYRACUSE, N. Y. — How high efficiency air filters have been used to help solve production and operational problems in the missile and aircraft industry has been issued recently by Cambridge Filter Corp. here.

Booklet, entitled "Air Filters for the Aircraft and Missile Industry," covers their use with computors, in precision assembly areas, in hot laboratories, with ground support equipment, and for missiles.

Copies are offered free of charge to those having a direct interest in these filtering problems and who request a copy on their company letterhead.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

Imperialine
EXTRUDED ALUMINUM GRILLES

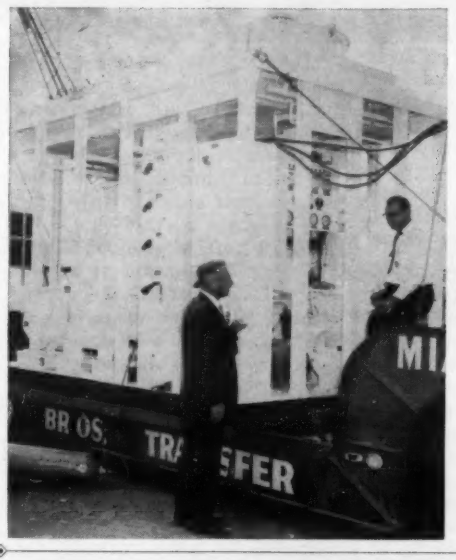
Featuring trim, attractive, straight-line styling, Tuttle & Bailey Imperialine EXTRUDED ALUMINUM GRILLES are the answer to architectural demands for air distribution equipment that will harmonize with, or accent, linear design concepts. Universal in application, Imperialine Grilles may be used on the supply or return portions of heating, cooling, or ventilating systems and are ideal for ceiling, sidewall, floor, or sill installation. A Tuttle & Bailey exclusive, the grilles are standard with satin anodized finish. Special finishes and colors are also available.

For complete catalog data on Imperialine Extruded Aluminum Grilles, ask your nearest T&B Representative or write direct.

TUTTLE & BAILEY division of Allied Thermal Corp., New Britain, Conn., • **TUTTLE & BAILEY PACIFIC, INC.** City of Industry, Calif.

Count Down Cooling

Powerful Unit Chills Missile To Cut Misfires



TRAILER-MOUNTED air conditioner produces 2,280 cfm of 20°F air to chill Atlas missiles to 35° just prior to firing. Reducing temperatures below 40° helps prevent malfunctioning of delicate control mechanisms.

SAN DIEGO, Calif.—One of the world's most unusual air conditioning units is cutting down the percentage of misfires at Atlas missile launching pads.

Convair Astronautics, prime contractor for the missiles development, learned early that high temperatures within the missiles were the most frequent source of component failure, resulting in tremendous losses when "something went wrong" when the missile motors were ignited. Tests proved that temperatures within the missiles, when charged with fuels, and readied for firing, often went far over 100°F, causing delicate mechanisms to function improperly, or not at all.

What was needed was some efficient means of introducing tremendous quantities of chilled air into the base of each missile on the launching platform, obviously. Originally, it was thought that commercial air conditioning equipment already available could handle the job, but it was soon found that none could be located of sufficient capacity within the size limits which the launching pad imposed, and also, that most commercial refrigeration units utilize water in operation in one form or another.

Consequently, William Stacey of the Convair plant in San Diego, was handed the job of designing a portable unit, which could produce more than 2,000 cfm of air at 20° or less. Stacey worked out the plans, and took them to Antelline Mfg. Co. of San Diego, for the actual construction.

The result has been a self-sustaining unit which can be moved from point to point on a flat-bed trailer, which can produce 2,280 cfm of air, which leaves its coils at a temperature of 20°, entering the long, flexible ductwork connected with the missile, at terrifically high velocities.

When used for cooling prior to launch, the refrigeration unit is set up from 150 to 200 yds from the Atlas, with flexible piping funneling the chilled air to a connection on the side of the missile, which then distributes the air through a series of perforated ducts, to maintain over-all temperature throughout the towering steel structure at an average of 35°.

Maximum allowable temperature within the compartments of the typical Atlas missile is 40°, according to Stacey, who is pleased with the fact that his "portable" unit has been able to keep the temperature at 35° on the hottest summer days, and when tremendously powerful, heat-carrying fuels are being pumped aboard.

Controls on the operating console within the cement block house from which the Atlas is fired activate the air conditioning equipment, and break the connection between the two a second or two before the actual firing takes place. The refrigeration unit operates on a moisture-removal principle which involves first cooling the air taken in, expanding it, through heating, and re-cooling it, before it passes into high pressure plenums, and the blowers which set up the tremendously rapid air movement.

Thermoelectric Devices Control Vital Filter Temperature In Space Probe

PITTSBURGH — Thermoelectric cooling devices built by the Westinghouse semiconductor department were used recently to control the temperature of crystal filters in a successful space probe by an Aerobee-Hi rocket. The flight, conducted by the Naval Research Laboratory, reached an altitude of 130 miles.

The thermoelectric units controlled the temperature, within 0.5°C, of the crystal filter in an infrared detection system that was part of the test. Close temperature control is necessary in the detector to obtain proper wave length range for the data obtained during the flight.

The thermoelectric units used in the Naval Research Lab test are similar to modules currently available from Westinghouse for cooling military and industrial electronic equipment. The NRL probe is the first such mission where thermoelectric units have been used for both heating and cooling.

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COOLING TOWERS
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in single factory-assembled units

IDEAL FOR MISSILE BASE INSTALLATIONS

Over 3,000 TONS of B.A.C. Cooling Towers now being installed

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Baltimore Aircoil Company, Inc. P.O. Box 7322, Baltimore 27, Md.

George C. Webster To Conduct Business Sessions on ARW Hanseatic Cruise

CLEVELAND — Announcing a change in the program for its forthcoming 25th annual convention, the Air Conditioning & Refrigeration Wholesalers said George C. Webster, president of George C. Webster & Associates, Washington, D. C. management consultant firm, will conduct the business sessions.

Webster replaces Dr. Theodore Beckman of Ohio State State university, who, as previously announced, had been retained to conduct these sessions. William C. Miessemer, ARW president, explained that Dr. Beckman asked to be relieved of this duty "for personal reasons" and that the Executive Committee agreed.

The convention will be held aboard the *S. S. Hanseatic* Oct. 28-Nov. 2.

Regarding Webster's educational and business background, it was noted that while working for his father in the retail plumbing field, he received his B.S. degree in mechanical engineering from Maryland university in 1943.

In 1948, Webster was awarded a Bachelor of Law degree from Georgetown university. Later, he enrolled at the Harvard Graduate School of Business and commuted between Harvard and his business. In 1951, he received his Masters degree from Harvard.

In 1953, Webster established Wilson Supply, Inc. in Washington as a distributor of heating, air conditioning, and some plumbing products. In 1954, he earned a Masters degree in business and anti-trust law from Georgetown. Today he is a Ph.D. candidate in business administration, American university.

Webster has withdrawn, for the most part, from the active management of his various business ventures to concentrate more on the management consultant side. He is a lecturer in the graduate course on budgeting at American university, has lectured before many trade groups, and authored numerous articles for trade and Small Business Administration publications.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

In Miami

150 at Management Seminar

MIAMI, Fla. — Methods of compensating salesmen, estimating labor costs, and general problems of how to run a business were major items of group discussion during an all-day management seminar sponsored here recently by the Air Conditioning, Refrigeration, Heating & Piping Association of Miami.

Some 150, instead of an anticipated 80 to 90, attended the meeting, which was conducted by Dr. E. A. Fails and D. S. Shepherd, Jr., officers of the Heating & Air Conditioning Research & Development Association, Raleigh, N. C.

At the morning, afternoon, and evening sessions such topics were discussed as direct costs, material to labor ratios, overhead, lost labor, bidding procedures, use of records, budgets, and managing people.

The discussions got down to such details as pointing out that materials shrinkage averages 3.8% for all materials sold and that lost labor can reach 18% of total labor paid.

Another seminar has been scheduled for Miami Dec. 3, and similar seminars in other cities are in the planning stage.

New Orleans To Get 68 Air Conditioned Busses This Fall

NEW ORLEANS—Sixty-eight air conditioned busses will go into service on city streets here this fall, the New Orleans Public Service Co. announced.

The busses are part of an improvement program pledged by the company when it asked for a rate increase last spring.

Last summer in:

Oklahoma City, 30 new air conditioned busses were put into operation by the City Bus Co. with an immediate noticeable increase in passengers.

Chicago, 17 air conditioned buses began operations between the Loop and O'Hare and Midway airports.

San Antonio, 25 air conditioned "DreamLiner" busses were introduced into service with three days of free rides. Ten more are scheduled to start work in October.

Houston, bus patrons queried in a transit company survey, volunteered the information that more air conditioned busses were needed.

NAPC Appoints Schmitz To Head Department

WASHINGTON, D. C.—Fred A. Schmitz, plumbing and heating contractor of Redwood City, Calif., has been appointed chairman of the Technical Dept. of the National Association of Plumbing Contractors.

NAPC President Carl N. Finley named Schmitz, a 24-year member of the association, to succeed the late Harry L. Stevens, of Hutchinson, Kan., who died suddenly on Aug. 14.

H. L. Buffington on Mission In So. America

SPARTANBURG, S. C. — Herman L. Buffington, president of the Beverage Air Corp. here, is a member of the "task force" that went to South America Sept. 10 on a trade promotion trip with Gov. Ernest F. Hollings of South Carolina.

California RSES Board To Meet Sept. 25

LONG BEACH, Calif. — Development of plans for both the Cal Poly work shop in San Luis Obispo Jan. 20-21 and the convention to be held here April 21-22 will come before the board of directors of California Association, Refrigeration Service Engineers Society, at its quarterly meeting here Sept. 25.

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INTERCOOLERS
AFTERCOOLERS
CONDENSING
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BOILING
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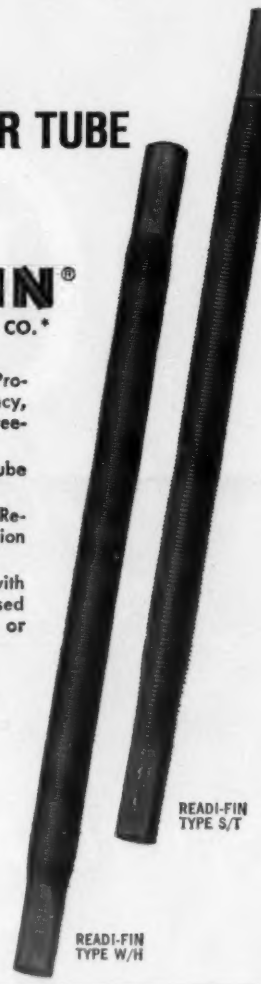

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'Project Mercury' White Room

Space Capsules for First Astronauts Assembled In Precisely Air Conditioned 'Super Clean' Area

ST. LOUIS—"Project Mercury" space capsules, in which the first American astronauts will go into orbital flight and return safely to earth are being assembled in precisely air conditioned "super clean white rooms" at the McDonnell Aircraft Corp. plant at Lambert-St. Louis municipal airport.

The capsule, designed to withstand any anticipated combination of acceleration, heat input, and aerodynamic force, will provide a controlled environment to protect the astronaut against the hostile conditions of outer space, and will provide him with the option of manual or automatic controls.

"Project Mercury" will also provide a means of recording and studying the psychological and physiological effects of space flight on man.

In this program, there is no margin for error, points out George R. Kline, plant engineer for McDonnell. All controls, both reaction and environmental must function perfectly and respond accurately and immediately.

PORTION of assembly line in class 6 white room at McDonnell Aircraft Corp. plant.

These highly complex electronic controls can tolerate neither dust particles to interfere with operating mechanisms nor rust which might originate from human contact during assembly operations and which might well cause equipment failure.

To assure freedom from contamination, it is necessary that the assembly operations be performed in an area having a high degree of environmental perfection.

White Room Specifications

Specifications called for the 90 by 100 ft Project Mercury white room to be maintained at 74°F temperature and a relative humidity of not more than 50% to provide for worker comfort, control of perspiration, and dimentional control of materials.

They also called for incoming air to be filtered as completely as possible. Actually the system filters out dust down to .3 of a micron.

Heat load was calculated at 142 tons—78 tons for fresh air, 26 tons for conduction, 23 tons for electrical equipment, and 15 tons for lighting. Outdoor design conditions are 95° db and 78° wb.

To handle this load, a 150-ton chilled water system was selected.

The Project Mercury white room is located adjacent to another white room where electronic components are assembled. Since heat gain for both rooms are similar, their chilled water circuits, condenser water circuits, and the central vacuum system are combined. Mechanical equipment for both systems are located in the same basement room.

As a result, McDonnell gets the advantage of greater capacity reduction on light load days, lower installation costs per ton, centralized maintenance, and additional flexibility in maintaining continuous conditioning in event of a partial equipment failure.

"Paralleling of the four 75-ton Trane chillers, for example, enables us to maintain desired room conditions in event of one chiller failure," Kline commented.

"This is extremely important, as failure to maintain acceptable environmental conditions could result in a complete shutdown of the entire area."

Project Mercury white room has a 12-ft ceiling except for one corner where a 30 by 35-ft special assembly area has a

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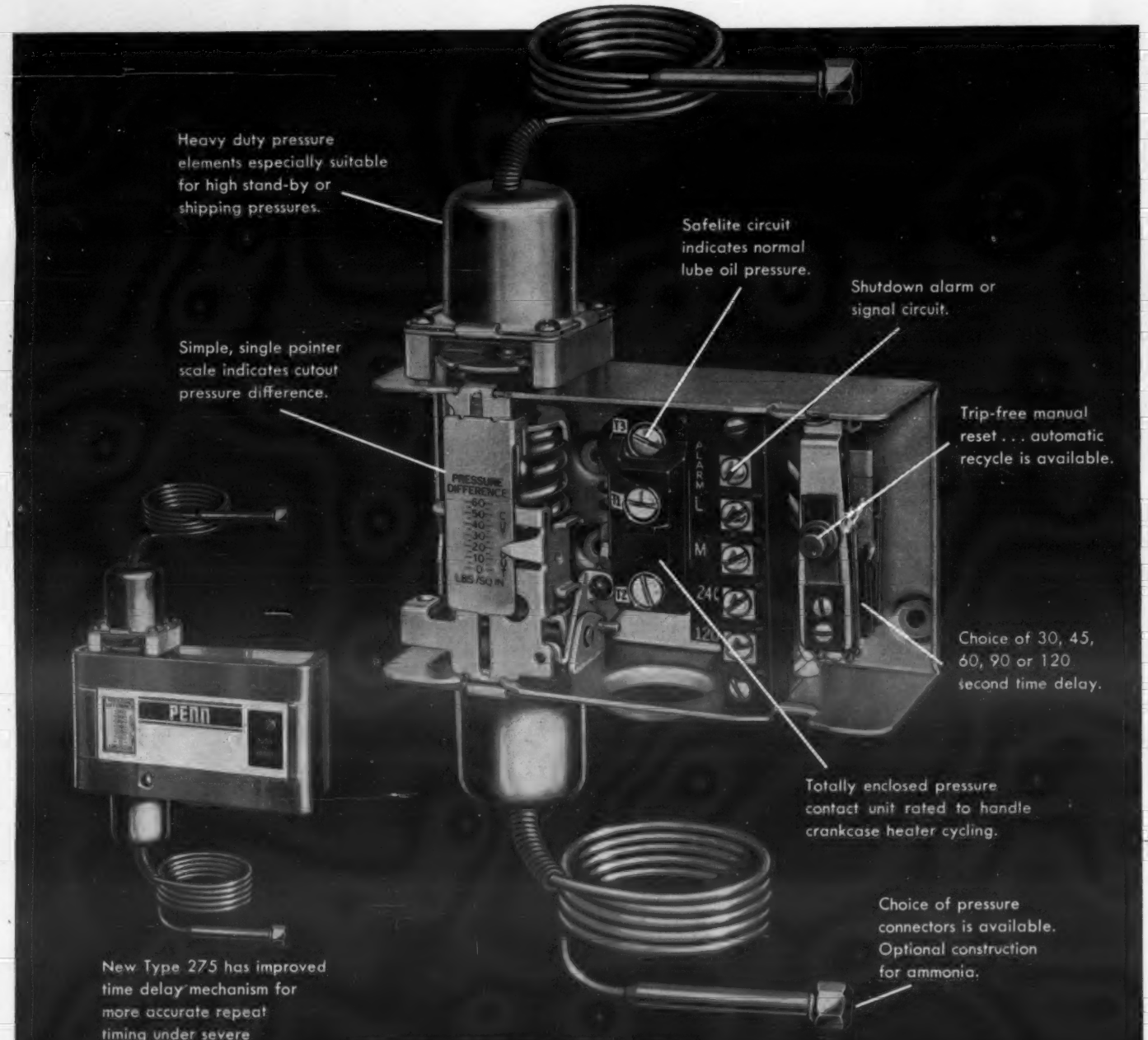
Heavy duty pressure elements especially suitable for high stand-by or shipping pressures.
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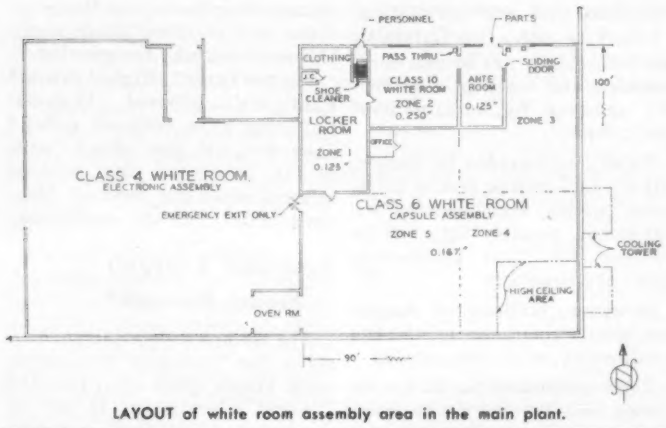
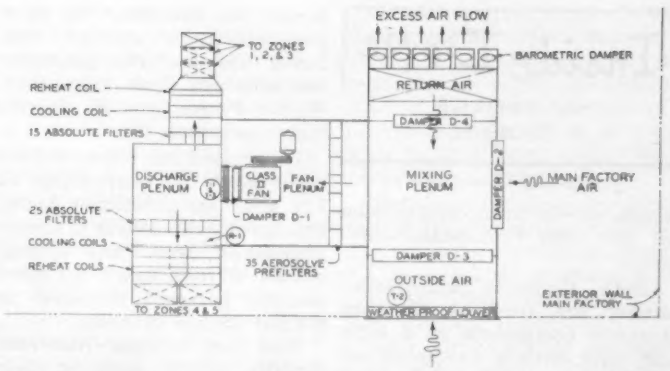


LAYOUT of white room assembly area in the main plant.



LAYOUT of white room air handling system located in truss of main factory building.

17½-ft ceiling. Lower chord of the main factory truss is 20 ft above the floor. It is on this truss, above the white room, that the field erected multi-zone air handling unit is installed.

A combination of outside air, main factory air, and return air from the white room are brought into the mixing plenum of the air handling unit. Dampers modulated by a thermostat in the discharge plenum, regulate the amount of air taken from each source to maintain a fan discharge temperature of 55°. A static pressure regulator modulates a damper at the Sturtevant supply fan to maintain a constant air flow.

"The prime function of the Johnson Service Co. R-302 static pressure regulator," explains Kline, "is to remove resistance to flow at the fan damper to offset increasing filter resistance as the filters become dirty.

"The damper is designed to react slowly so it will not react to pressure changes caused by normal opening and closing of doors, and assure constant flow to all zones after the original balancing of zone dampers."

Between the mixing chamber and the fan area a battery of 35 Cambridge "Aerosolve" disposable filters with an average efficiency of 96% removal of all airborne particles.

Final filtering after the fan is done by two banks of Cambridge "Absolute" series 1F-1000 filters. They are said to be 99.97% effective against 0.3 micron particles.

One bank of 15 filters serves zones 1, 2, and 3, while another bank of 25 filters serves zones 4 and 5 of the white room.

After these filters, the air passes over Marlo cooling coils and reheat coils before diffusion through Agitair diffusers.

Entire Room Pressurized

To prevent infiltration of dust, the entire white room is pressurized. But it is divided into three separate areas of varying pressurization according to cleanliness priority.

Assembly of environmental and reaction controls is performed in an area separate and isolated from the main assembly area. It has the highest cleanliness priority and is pressurized to 0.25 wg.

General assembly area is pressurized at 0.167 in. wg and the locker room at 0.125 in. wg.

With doors shut, air from the environmental and reaction controls assembly room relieves through barometric dampers into main assembly room.

The main assembly room relieves to the main factory area through barometric dampers above the oven area (outside the white room) and in the return air duct. Return air grille is 14 ft above the floor in the high ceiling area directly below the air handling platform in the trusses.

Locker room relieves to the general shop through a relief air duct connected to the automatic shoe cleaner.

As indicated, the white room is divided into five zones. Zone 1 is the locker room, zone 2 the high pressure room, and zones 3, 4, and 5 the general assembly room.

Each zone is individually controlled by a Johnson thermostat and humidistat under a common cover. When temperature or humidity rises above the zone thermostat or humidistat setting, a three-way valve modulates chilled water flow to the cooling coil to maintain desired temperature and humidity.

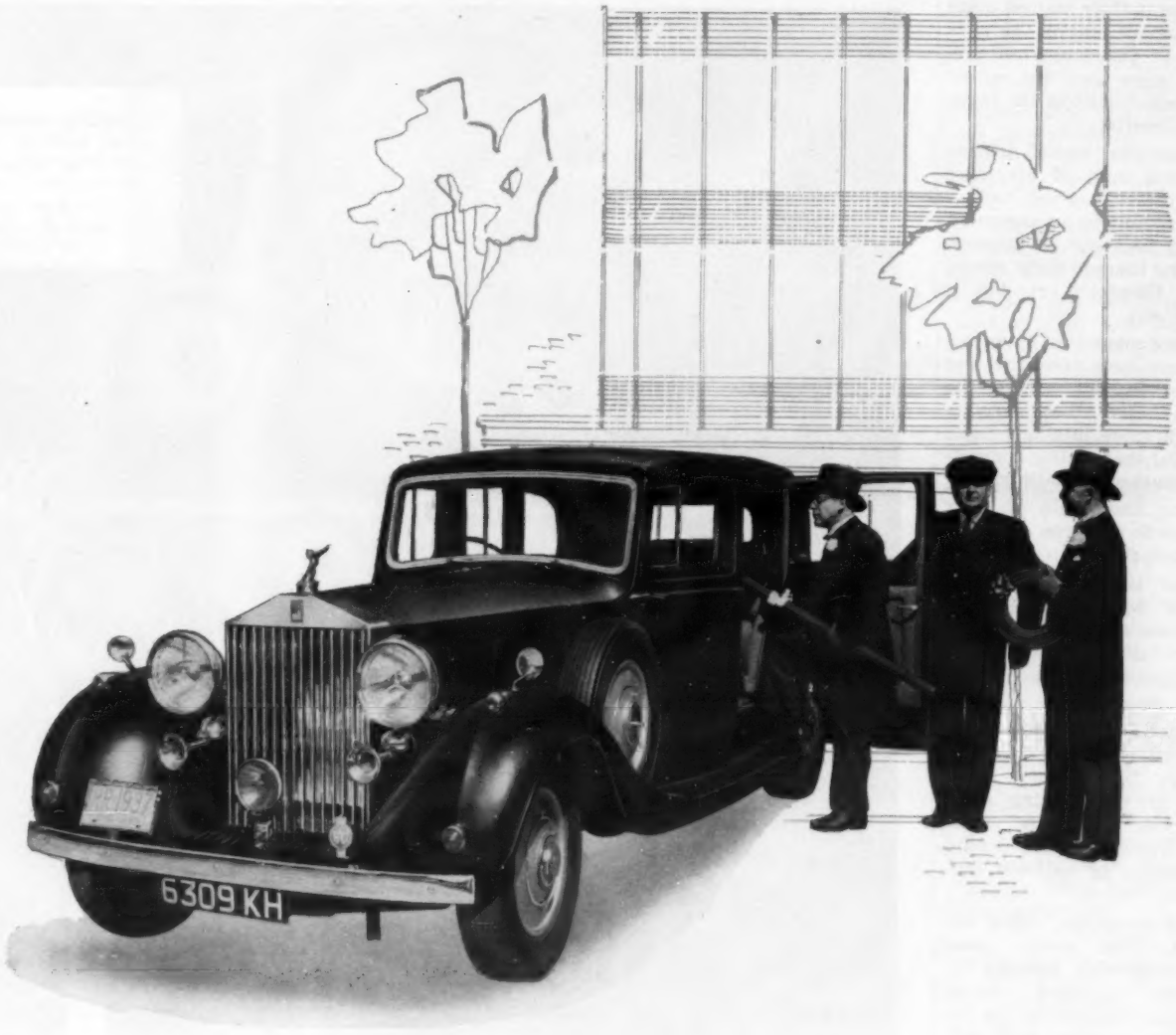
The thermostat also modulates a steam reheat valve to maintain desired room temperature after dehumidification.

Control sequence for chiller operation is as follows:

On a rise in outdoor temperature to 54°, an outdoor thermostat controls three switches to start the Bell & Gossett condenser water pump and chilled water pump and to energize a solenoid air valve to activate an eight point step controller.

The step controller has its bulb in the common chiller supply header and controls chilled water temperature by controlling the refrigerant solenoid valves on the four chillers.

The chillers' suction pressure controlled cylinder unloading valves act independently.



In Our Executive Fleet

Viking executives take a keen delight in getting behind the wheel of this Rolls Royce . . . not only because it is the epitomy of quality . . . but because they feel it presents exactly the right background for the delivery of Viking Copper Tube. What better setting for a fine jewel than an elegant satin-covered jewel box?

VIKING copper tube co.
CLEVELAND 10, OHIO

The 1937 Phantom III, 12-cylinder Rolls Royce is a Classic. Formerly belonging to the Lord Mayor of Kingston-on-Hull, it is now in our service. Viking personnel, however, drive American made cars.

Inside Dope

By GEORGE F. TAUBENECK

(Continued from Page 1)

tends, should be the major issue of the 1960 Presidential campaign.

Both Galbraith and Schlesinger are fond of the *non sequitor* comparison of a little old lady with a toothache *vs.* tail fins on an automobile.

Through their stained spectacles, advertising is "evil," for example, and should be taxed heavily—because it encourages "buying units" (families) to spend their own earned incomes.

Advertising, in short, creates desires which common people shouldn't be allowed to indulge!

"The engines of mass communication, in their highest state of development, assail the eyes and ears of the community on behalf of more beer, but not of more schools," mourns the lugubrious Galbraith.

This character would deprive the working man of his chief solace after a day of toil—a beer! There may be an argument for taking men out of taverns, and sending them to night school to study Etruscan art, but it will never sell.

"We have committed ourselves —or . . . we have permitted our leaders to commit us—to the fatuous thesis that private spending is more intelligent and more useful than public commitments," scathes Schlesinger.

Enjoying the fruits of their own labors is just too good for the common people!

Each of these would-be renewers of New England Blue Laws advocates a backasswards theory, to wit:

Plain American citizens aren't suffering enough.

"We have it too good," castigate these Harvard (richest college in the world) profs. "Tailfins, air conditioning, nursery schools, swimming pools, pleasure boats, etc., are deplorable examples of national self-indulgence.

"In the meantime," they add in effect, "we aren't taxed enough to provide housing developments (planned slums) plus bridges and roads (on the construction of which local politicians get fat) and higher salaries for bureaucrats and professors like ourselves."

Consult Parkinson for the ultimate answer to this exploded theory.

Who's Too Rich?

It's the Galbraith-Schlesinger dictum that American people shouldn't be permitted to buy what they need and want with what they have left after they shell out for the tax collectors.

Instead, the Government should confiscate even more of their money, and deploy such robberies toward "national goals"—such as an artificial 5% increase in production annually. Russians do that, they aver.

"Whatever the Communists do, we must follow" is their apparent thesis.

However, increased production is not our problem. We have over-capacity to produce. Our farms and factories presently can turn out much more than We the People are able or willing to purchase.

We do need the *means to consume more,* the wherewithal to buy what our production facilities already can deliver in superabundance. Ask any young mother of four, nearly all older couples, harassed husbands in normal income brackets. . . .

How can striving American families achieve more of their aspirations? The answers are clean and simple: Lower taxes, less repressive and comprehensive government.

As to that Economic Growth Shibboleth, best way it can be attained is through private enterprise, with encouragement from a friendly government *via* more rational tax policies.

If business suffers because citizens are forced to suffer, won't tax revenues dry up? How else can sales and income taxes be collected except through better business—more sales of more consumer goods to more families?

Of Course We Sacrifice!

Sacrifice for the sake of expanding Federal power over our personal lives obviously is not a worthy cause. For presumably free people it is downright ridiculous and self-immolating.

Blue Law advocates Galbraith and Schlesinger live in rich communities, and teach in a university endowed by multi-millionaire alumni.

Totally surrounded by yachts, estates, tax-exempt bonds, debutante parties, and lingering social castes, possibly they can be excused for their beside-the-point obscurantism.

However, millions of American breadwinners are behind the 8-ball every week and month.

Their instalment payments for homes and furniture and compact cars never give them an opportunity to indulge in sports-cars or cabin cruisers or summers in Bar Harbor or Bermuda —the sort of thing which many Harvardmen take for granted.

Higher taxes? Higher prices? Politically imposed Personal Suffering as a national policy? Jake and Art just aren't "with it" in terms of the genuine citizens who live west of Harvard under average conditions.

You and I Aren't Smart Enough?

The Galbraith-Schlesinger thesis is that "someone" in Government knows more than you and I about everything. It can be suspected that they consider themselves highly qualified for that Pharaoh job.

What do rockets have to do with

Providing tremendous thrust, new rocket fuel oxidizers such as liquid fluorine, chlorine trifluoride and other halogen fluorides may help us to conquer space. Like "Genetron" fluorinated hydrocarbon refrigerants, they are important developments of General's long research in fluorine chemistry.

"Big Brother" should decide what we ought to do, *and especially what we should do without.* As they put it:

"Government would choose for the less intellectual and hence more 'frivolous' people what such persons ought to have, not necessarily what they want."

To any foreign visitor (and this department entertains many "good neighbors" frequently and pleasedly) it is almost painfully obvious that the U.S.A. already possesses and exhibits the most lavish Public Construction Projects in the World.

Schools, highways, hospitals, housing developments — you name it, we have it . . . extravagantly. Why, then, should we be taxed more heavily to construct additional National Monuments?

Answer: for the greater glory and profit of politicians and bureaucrats, and possibly to assuage guilt feelings of the Landed Gentry.

Professors Galbraith and Schlesinger sometime, somewhere, should have read the classic Gibbon's *"Decline and Fall of the Roman Empire."*

Monstrous taxation, unnecessary public works, and unbridled inflation have constituted political appeasement programs of all worried aristocracies throughout world history.

Dedicated students of government-as-a-science realize that it's a fantastic misanalysis of economic theory to oppose satisfaction of consumer desires because they might interfere with the erection of National Monuments.

The Pyramids, hoisted by the defunct Cheops of Egypt . . . come to mind. . . . Shall the Landed Gentry real-estate speculators be triumphant forever?

As They See 'the Issue' In London

"Chief hindrance in the way of continuing to increase the British people's standard of living at home is Britain's failure to increase its sales abroad," accuses London's erudite publication, *The Economist.*

"Britain's lack of salesmanship abroad is a direct reflection of high-minded resentment of it at home, which two important groups in British political life—the aristocratic right of the Conservative party and the intellectual soft centre of the Labour party—have been guilty of inculcating."

(Both political blocs have been dragged kicking and screaming into Britain's domestic consumer revolution—which involves refrigerators and central heating for everyone.)

"To both factions advertising is a dirty word.

"While the fatal error of the British in the 1940's was our attempt to drive forward to a welfare state before we would afford it, the greater danger of the 1960's is our desire to luxuriate in an affluent society before we have achieved it.

"Moreover, this time, the attitude of top company executives are just as dangerous as those of trade union reactionaires. The higher the social level, the more crippling the attitude.

"At the time of the ennoblement of the great families of, say, Guinness and Hudson, radicals rejoiced that the blue blood of old England was thus being sensibly re-energised with healthy admixtures of beer and soap.

"Actually, one now suspects, it was the reverse that was then happening. The aristocratisation of the scions of the country's board-rooms may have been a disastrous factor in de-vulgarising and thus de-energising this nation's commercial life.

"In the management of our internal affairs it might be a cosy and civilising thing if we could devise some system of rendering ever more fully unto the Royal Fine Arts Commission the things that are Mammon's. In exports we simply cannot afford to do so.

"Recently there took place in the Lords an hour-long debate in which spoke a former Prime Minister of this country, a former senior cabinet minister in his Labour government, a former Conservative Lord High Chancellor, the present leader of the Liberal party, a former Governor of five of our great overseas colonies, and a former chairman of one of our great joint stock banks.

"And for what had this galaxy of talent assembled on a Monday afternoon? They were engaged in indignantly pushing through, by 35 votes to 32, a motion to prevent certain vendours of ice cream from attracting customers by sounding chimes from a bell on their vans. In this single cameo of debate the main reason for our relative impoverishment was to be found."

Q.E.D. From Oxford to Harvard to oblivion.

Thoughts for the Week

If you will find the parents who bother to talk with their children, parents who realize that school is the least likely place for children to acquire an interest in life and learning, and that the dinner table, the hike, the fireplace, and deep armchairs are the best, you will find the children with keenest minds and most eager eyes. You will find the children who have a heritage of the ability to live fully and happily, a heritage that will last their lives through, and touch their children's children.—*Columbia.*

People are not just things. Other people are as sensitive as you. When you disregard their feelings and put them in turmoil inside they are not likely to do their best work for you. In short, if you want to be effective in your relations with others, learn to understand and appreciate people.—*Personnel Journal.*

genetron® super-dry refrigerants?

Just this. Part of the "big push" into outer space may come from fluorine-based propellants now being supplied by General Chemical to the nation's rocket and missile research centers. The same know-how that makes General the leader in fluorine chemistry applies equally in other areas – especially in the development and production of "Genetron" fluorinated hydrocarbon refrigerants.

Behind "Genetron" Super-Dry Refrigerants is a research organization which is internationally recognized for its work in fluorine chemistry. Even more important to every user of "Genetron" refrigerants are the Company's advanced manufacturing facilities, which have helped bring quality standards for fluorinated hydrocarbon refrigerants to new "highs" of purity and dryness—a major contribution in itself. "Genetron" refrigerants are approved, accepted, *preferred* because they are *performance-proved.* Refrigeration engineers, contractors and servicemen endorse them. Wholesalers recommend them.

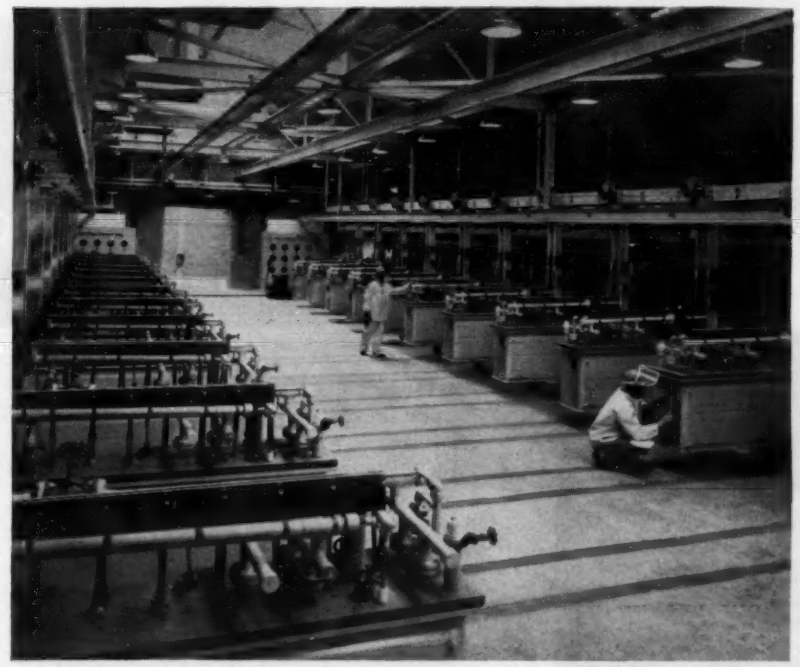
It makes sense to rely on the leader in fluorine chemistry for fluorinated hydrocarbon refrigerants. Next time you order, insist on "Genetron" and be sure of the best! Available from wholesalers everywhere.

Allied Chemical

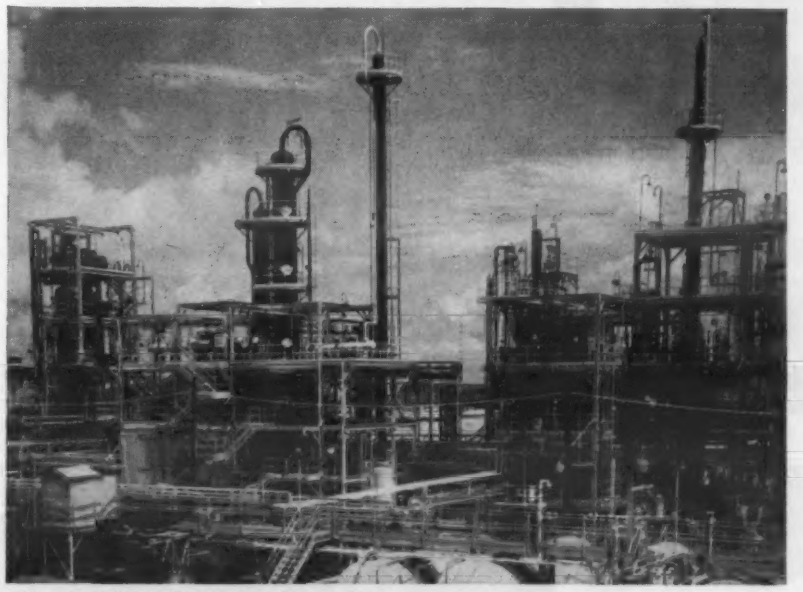
GENERAL CHEMICAL DIVISION

40 Rector Street, New York 6, N. Y.

Look to the leader in fluorine chemistry... insist on "Genetron."



Largest privately-owned fluorine producing facilities in the free world are located at General Chemical's Metropolis, Illinois, Works. In these fluorine cells elemental fluorine is produced for use as a high-energy oxidizer of rocket fuels as well as for production of uranium hexafluoride for the Atomic Energy Commission. Allied Chemical's leadership in working with fluorine and fluorine compounds is applied to continuing improvement of "Genetron" Super-Dry Refrigerants.



This giant fluorochemical center in Baton Rouge, La., makes many of the fluorine-based compounds required by industry and is a major production center for "Genetron" refrigerants. "Genetron" refrigerants are also manufactured in Danville, Illinois. Soon a new plant, now under construction in Elizabeth, N. J., will provide east coast users with a large source of "Genetron" Super-Dry Refrigerants.

TECH CENTER

by Frank J. Versagi, Technical Editor

Aluminum In Fabricating Air Conditioners

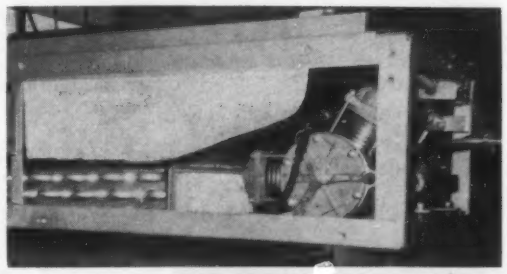
That there are problems in using aluminum to fabricate air conditioners is commonly known. Some manufacturers have tried aluminum and decided against it; others are now attempting to incorporate aluminum fabrication into their production lines; the majority of firms are waiting to see how the pioneers make out.

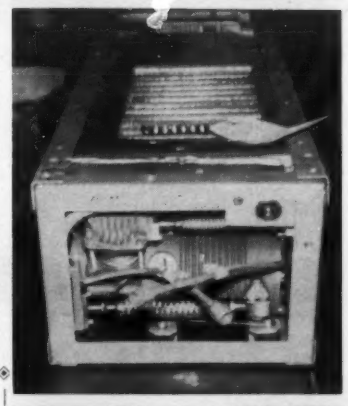
Great Lakes Mfg. Corp., Cleveland, producing all-aluminum air conditioners for the Military, has strong and knowledgeable opinions on the state-of-the-art and on practical considerations which must be met before aluminum can become a widely used material of air conditioning construction.

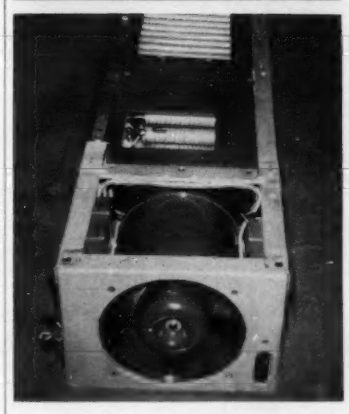
CLEVELAND — "The all-aluminum air conditioning system is in demand by the military now; it is only a question of time before this concept is felt in commercial equipment."

The question is not "if"; it is "when," according to T. G. Crider, staff engineer of Great Lakes Mfg. Corp., 4223 Monticello Blvd., Cleveland. Great Lakes is already shipping all-aluminum air conditioners with cooling capacities close to 5,000 Btuh, measuring about 38x8x10 in., and weighing 68 lbs. The company is developing larger equiment for the Military and has received a contract from the U.S. Army Engineering Center, Fort Belvoir, Va., for lightweight hermetic air conditioning compressors in six models. The compressors are to be designed for Refrigerant-22 and with both 60 and 400-cycle power drives.

"Every exposed area of the air conditioner is aluminum," Crider says. "This is a must where the units will be exposed to salt water area ambients."







THREE views of lightweight air conditioner: Side view of compressor end shows fiberglass evaporator housing. Compressor end, with its shock-resistant mounting, also serves as condenser air outlet. Top view from condenser blower end indicates relative position of coils and components.

Crider recalled some tests with coils fabricated of copper tube and aluminum fins. "After 800 hours in the salt spray test, coil capacity dropped off about 9%; at the end of 2,000 hours, capacity was down 19%. Beyond 2,000 hours, he said, the fins and tubes became so coated with electrochemical corrosive products that air movement was blocked, further reducing capacity.

"Unfortunately, when the capacity of a unit drops off for these reasons, the user suspects that the cycle itself is at fault, that something is wrong with the compressor or the controls."

So Great Lake's Model 101-185 air conditioner makes use of all-aluminum coils for evaporator and condenser.

The heating and cooling unit also makes use of an aluminum capillary tube and aluminum-finned cartridge heater element for heating console air at ambients as low as -65°F.

And what of all the problems one hears about?

They exist, Crider admits, but he holds that they are not insurmountable. We use both soldered joints and heliarc welded joints," he says. "Each has its place. As a general rule, we recommend the use of soldered joints on any component or assembly which can then be washed and flushed with hot water. Coils fall into this category.

"On closure connections, though, as where our lines end in an aluminum header in which are our pressure protective devices, heliarc must be used, since it would be physically impossible to wash out all the residual flux if the joint were soldered.

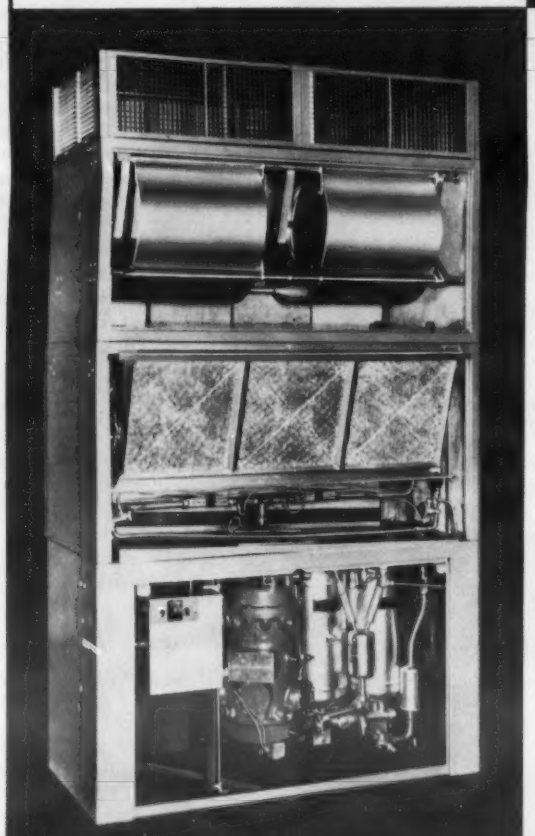
"It is important to remember," Crider admonishes, "that heliarc welding is not a cure-all; there can be leaks in such joints, as well as in soldered joints. It is, nevertheless, somewhat easier to patch leaks in a heliarc joint."

This matter of leaks is a key factor in Crider's evaluation of suggested resin-bonding of alu-

WOLVERINE TUBE HELPS

CHRYSLER

"CREATE CLIMATE FOR LIVING WHEN NATURE DOESN'T"



CHRYSLER PACKAGED AIR CONDITIONER

Suction lines. Capillary tube. Light wall special temper tube. Finned tube and plain. All these Wolverine products have important places in the evaporative and condensing units which are the hearts of Chrysler air conditioning systems. You'll find Wolverine products in most Chrysler units.

Chrysler is famous for firsts in air conditioning research and development, just as Wolverine has paced the field in pioneering tubing ideas and products to serve the industry. Important Wolverine developments for all industries include Wolverine Trufin®, the integral finned tube; Wolverine Capilator®, the capillary tube for precision metering of liquids and gases, and light wall special temper tubing.

When you specify Wolverine seamless copper, copper alloy or aluminum tube—you are cashing in on the high quality and outstanding service that only experience can give. Write for complete information as to how Wolverine can help you. Do it now.

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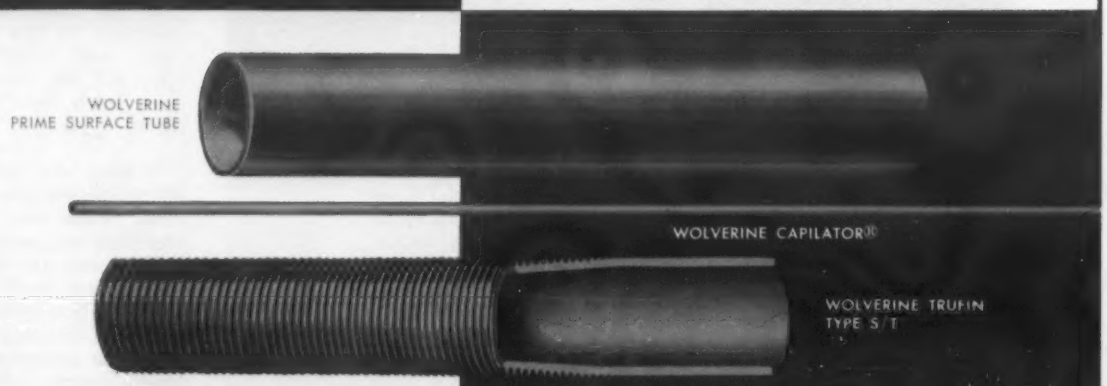
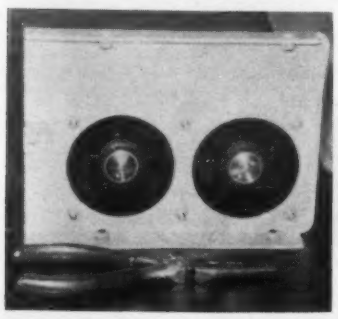


COMPRESSOR housing with motor stator assembly and all internal parts.



SIZE of the evaporator blower assembly is indicated by the comparison with a pair of hand pliers.

static pressure. High-speed (7-11,000 rpm) axial flow fans move air through the condenser.

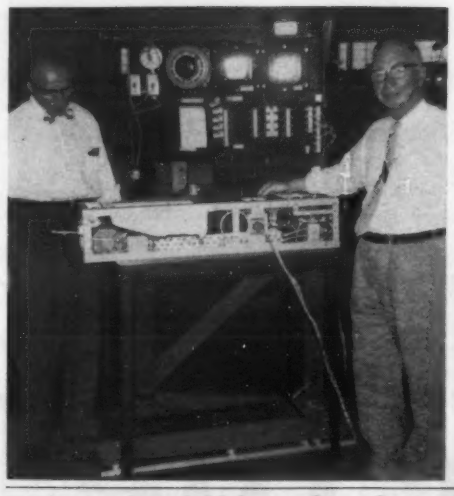
An air vane switch cuts the main electric circuit if it senses insufficient air flow.

The compressor is non-position-sensitive; it will operate horizontally, vertically, and in-between. The compressor is "oil-mist lubricated"; it has no oil sump or pump, and only 5 oz of oil are charged into the entire system.

The compressor motor is protected against locked rotor by a circuit breaker, and in addition a temperature-sensitive protective device is located on the compressor itself for overheat protection.

Heaters in the compressor operate thermostatically to keep refrigerant from condensing there whether the unit is on or not, since cooling is required at ambients as low as 0°.

Because the 400-cycle equipment operates at high speeds, there is a higher sound level—70 decibels are allowed on the Model 101-185; 50 db is the limit on a prototype now being developed for use on Polaris-equipped submarines.



CALORIMETER in the background is used for measuring the heat transfer capacity of the sensible cooling and heating air conditioner in the foreground. At the left is T. J. Galbos, a Great Lakes director, who supervises all assembly and test operations. At the right is T. G. Crider, Great Lakes Staff Engineer.

Some of the radial hermetic compressors developed by Great Lakes are not restricted to military equipment applications but can be purchased by other manufacturers for commercial systems, the company stated.

minum joints. "There is something to say for resin-bonding, but it is almost impossible to repair a leak in such a joint; the material must be scrapped. Since it is unrealistic to expect to fabricate any refrigerating cycle without occasional leaks, this non-repairability of resin-bonded joints is a critcal handicap."

Great Lakes has been able only to find two producers who can reliably supply all-aluminum coil configurations. "One reason, undoubtedly, is that it takes an entire extra set of tools to produce all-aluminum coils. The alternative of thoroughly cleaning and wire-brushing all copper-working tools before converting to aluminum production to avoid copper contamination of the aluminum is prohibitively costly.

One coil supplier tells Great Lakes that they cannot thoroughly flush the all-aluminum coils if they attach the headers to them, so the company uses heliarc welding to join the two sections.

The use of all-aluminum construction in these combination heating and cooling units is only part of the story of their success, however. Much creative design and engineering went into the units, which are used chiefly for electronic cooling—the cooling of electronic components in ground, ship-borne, or airborne applications.

Air passes over both evaporator and condenser sections longitudinally, rather than laterally as is conventional.

Tiny evaporator fans will move 350 cfm against a 3-in.

Kelvinator's Chapman On European Tour

DETROIT — B. A. Chapman, executive vice president of American Motors Corp. and general manager of Kelvinator Div., left recently for Europe where he will confer with manufacturing licensees about further strengthening of the company's position in the Common Market.

G. T. Etheridge, vice president of Kelvinator International Corp., is accompanying Chapman on the three-week European trip. They will inspect the manufacturing operations of the wholly-owned subsidiary, Kelvinator of England, Ltd., attend its board of directors meeting, and visit licensees in France and Italy. Chapman will also visit Norway and Sweden, where Kelvinator has licensees.

MORT CLARK'S **GALV-WELD** ALLOY ORIGINAL & GENUINE

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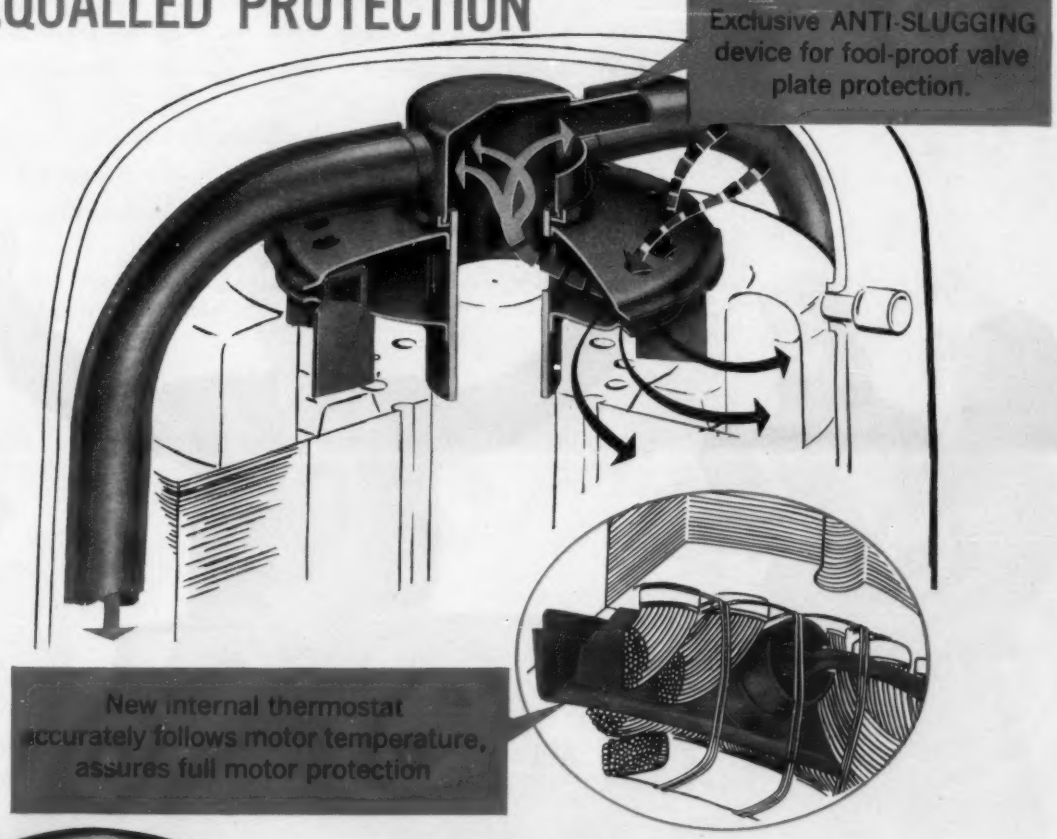
NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

UNEQUALLED PROTECTION


Exclusive ANTI-SLUGGING device for fool-proof valve plate protection.
New internal thermostat accurately follows motor temperature, assures full motor protection

CL SERIES COMPRESSORS
CL25—rated at 30,500 BTU
CL30—rated at 38,500 BTU
CL35—rated at 43,500 BTU
CL40—rated at 50,500 BTU

WIDER SELECTION . . .
WITH TECUMSEH'S NEW CL SERIES COMPRESSOR

This 2-pole, R-22 line of CL compressors provides Tecumseh's air conditioning and heat pump customers with unmatched advantages. Dual internal protection is furnished on the 3, 3½ and 4 H.P. models (the 2½ H.P. model includes the centrifuge only) as standard equipment. With normal charge and runs, the fool-proof Anti-Slug Device prevents oil or liquid refrigerant from reaching the valve plates. The internal thermostat is built *into the motor winding* to give instantaneous and accurate sensing of motor temperature at the most critical point and therefore removes compressor from the line at a safe temperature level. Both devices are *always* operative when the compressor is running and are unaffected by outside variables. In combination, they offer compressor protection unequalled in the field. This broad line, offered to Tecumseh customers for the first time, provides a closer match to your requirements. A full year of successful field tests have proven the new CL Series your best compressor buy. Investigate it today.

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Corner the Market

NEW! "CORNER THE MARKET" CAMPAIGN!

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NEW! INDUSTRY'S MOST LIBERAL FINANCING!

Free floor plan. Stock now, pay as you sell! No down payment. No off-season interest or carrying charges. You get complete flexibility in financing to fit your needs and your local market.

NEW! ADVERTISING THROUGH THE WINTER!

First big off-season promotion featuring Carrier's exclusive "12-Month Home Air Conditioning."

PLUS THE OTHER KEY MONEY-MAKING FEATURES OF A CARRIER FRANCHISE:

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- Complete emphasis on air conditioning—no dilution because of other interests.
- Solid support from the best established, most experienced distributor organization in the business. Carrier distributors, on the average, have sold the Carrier line for over 15 years.
- Strong national advertising backed by 25 years of continuous advertising effort. Every ad directs prospects to Carrier dealer listings in the Yellow Pages.
- Revolutionary advances pioneered by Carrier—including the new and sensational Carrier Automatic Air Purifier.
- Financing handled by a Carrier affiliate. Your customers get liberal terms and you gain their confidence.
- Sales training that is continuous and complete. Offers vital aid to you and your salesmen.
- On-the-spot help and training in the most modern techniques in engineering, service and business management.
- Carrier Planned Service—a high-margin profit maker and volume builder in off seasons. You can keep your service and installation crews intact and fully staffed year round.

The sooner you get started on Carrier's "CORNER THE MARKET" Campaign, the greater your "share value" and the bigger your prizes.
Get in touch with your Carrier distributor right away!

Carrier Air Conditioning Company
A DIVISION OF CARRIER CORPORATION

They'll Do It Every Time

by Jimmy Hatlo

THIS SPACE IS GOING TO WASTE··· AT LEAST SIX DESKS COULD BE PUT IN THIS SECTION·· H'MM··· THE PRIVATE OFFICES COULD BE PARTITIONED···
OH-OH··ANOTHER HATCHET MAN·· THEY'VE CUT THE STAFF TO THE BONE··NOW THEY'RE GONNA MAKE US USE DOUBLE-DECK DESKS!
ONE MORE ECONOMY WAVE··· SAVE SIX FEET OF SPACE SO BIGDOME CAN ENDOW ANOTHER CHORUS LINE···
YESTERDAY HE CUT THE PAPER TOWELS IN HALF··· WHY DON'T THEY JUST HIRE MIDGETS?
THAT EFFICIENCY GUY·· I KNOW HIM··· HE HAD A CANDY STORE THAT FLOPPED, SO NOW HE'S RUINING OTHER PEOPLE'S BUSINESSES···
GETTING ULCERS AS THE NEW AXE MAN MAKES WITH THE TAPE MEASURE····
THANX AND A TIP OF THE HATLO HAT TO PETE HOLLIS, OMAHA, NEB.
JIMMY HATLO
7-26
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Annual Model Introduction May Be on the Way Out

CHIEF CRITICISM of some American business methods today—and it's embarrassingly valid—is that they lag behind public opinion, personal preferences, and prevailing moods.

The fetish of "market research" for example, took an awful tumble when the most expensively and thoroughly "market researched" project of all time—the Edsel car—fell flat on its posterior.

Another commonly accepted practice, ANNUAL NEW MODELS, now is losing favor, also.

No longer is The Public willing to put up with the nonsense and sham sometimes connected with that previously salaamed theory-and-practice.

First intimations of boredom with the Annual Model idea appeared in the air conditioning and refrigeration industry several years ago.

Formerly, year-end National Exhibitions (such as sponsored by ARI and ASHVE) were prime opportunities for manufacturers to introduce new models of everything from valves and controls to industrial absorption systems and workable reverse-cycle residential units.

Somehow, somewhere, those annual show-off opportunities lost glamour—and economic justification—for producers in this business. Their exhibits at trade shows have spurred little excitement, or grass roots interest, ever since.

Next came the Volkswagen and the Rambler, neither of which changed shape annually, and both of which put the Big Three of autodom into a tizzy and a worrisome sales decline.

Although 1961 auto models will be jumping ("readjusting") to catch up belatedly with consumer desires for smaller and more economical cars, we hear whispers (in Detroit circles) that the Annual Model shibboleth is sick-sick, and soon will be dead-dead.

It has become too expensive (in terms of re-tooling) and it just doesn't register any longer with the more sophisticated buyers who are on the scene nowadays.

The latter don't go for spurious styling changes which merely "justify" higher prices, rather than enhance values.

Advertising *per se* could be a culprit in this antagonistic reassertion of consumer positiveness. "Honest Carr, the Used John Dealer," is typical of the most repeated and appreciated gags *in re* auto sales chicanery.

Consumers no longer trust glossy claims attached to annual models by advertising copy-writers, especially when inconsequential product variations are blown up out of all proportion to their intrinsic worth.

Nauseous TV "hard sell" commercials have added to the public's disenchantment with announcements of: "At Last: Atomium in the Door Latches."

People are looking for better quality, reliable performance, and fewer service calls —rather than sudden magic.

When an Annual Model is trumpeted with a tired "ingredient X" or a boresome Reversed Widget, consumers yawn and public apathy turns to scorn.

Moreover, these dubious "widget" crutches annoy distributors, contractors, and dealers nowadays. They're fed up, too, with a trumped-up Annual Model "pitch."

That "pitch"—for contractors and dealers—has meant quickie sales conventions and short-term seasonal advertising—both designed to stimulate local sales activities. Neither the quickie sales exhortation nor the brief advertising splash truly is effective.

"Inspiration" hoped for in these too-fast-and-forgotten activities dies a-borning. Such obsolete hypodermic needles just don't stimulate any more.

What retailers, wholesalers, and contractors—men on the firing line—really want is consistent *all-year-round promotion and advertising programs.*

Their salesmen need education. Their prospects need stimulation; and the whole "ball-of-wax" needs continuous reorientation to shifting consumer desires.

It's time to strive for long-term product performance, rather than continuing the "old hat trick" of adding padded falsies to the front.

George Romney, who is one of the straightest thinkers of our business generation, sums up the case against Annual Models:

(1) The inevitable waste in such a plan contradicts common sense.

(2) The attempt annually to create products that merely are camouflaged is a colossal misdirection of effort away from useful innovation.

(3) European competition, the coming Russian challenge, and the dire economic needs of developing countries, all emphasize the importance of concentrating our technical skill on fundamental *useful* advances.

Q. E. D.

AN INTERNATIONAL INSTITUTION • SUBSCRIBERS ALL OVER THE WORLD

Trade Mark reg. U.S. Pat. Office; Est. 1926

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'The Conscience of the Industry'

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From the Files of the News

25 years ago . . .

Air conditioning installations in Houston in the first eight months of 1935 totaled 27 units, a slight decrease from the same period in 1934. Largest single installation was a 943-hp commercial building job. Clothing stores lead in having the greatest number of jobs in the commercial field. . . . In Oklahoma City 18 residential and 31 commercial installations were made in the first seven months of the year.

Purchase of all the assets of D. A. Ebinger Sanitary Mfg. Co. by a newly formed organization, The Ebco Mfg. Co., was anounced by A. R. Benua, president. . . . Convinced by a three-year study that air conditioning means increased business for hotels, Col. Seymour Weiss, managing director of Hotel Roosevelt in New Orleans, contracted for complete summer conditioning of 113 guest rooms.

A survey of FHA loans made during August by National City Bank of New York City showed that second largest number of loans were made for heating installations, and third largest for plumbing repairs. Sixty-two loans for air conditioning were noted.

10 years ago . . .

Two competing groups in the frozen food locker field joined to form the National Frozen Food Locker Institute. . . . Regulation of consumer instalment credit through the revived Regulation W went into effect, calling for down payments of at least 15% and terms of no longer than 18 months. . . . Loudon Mfg. Co. announced a price increase of 5% on its whole line, stating that the change "reflects only a portion of our increased costs, which are still continuing to advance.

Calling air conditioning "Hospitality In a Package" a NEWS editorial pointed out that the restaurant market is a "natural" and a continuing good one for the dealer. . . . A Texas cafeteria operator was quoted as stating "Since we installed air conditioning, customers are comfortable, and it is easier to satisfy them. We've found that our average check is higher, possibly due to the fact that patrons get cooled off before reaching the service counter and feel like eating more."

The National Better Business Bureau warned against the "furnace repair racket" telling consumers that unless they are sure of the "character and reliability" of those with whom they are dealing, they are likely to find their furnace dismantled, and a new one needed, if they accede to a request for inspection of their heating system.

60 years ago . . .

From the RECOLD MUSEUM

These 50-to-60 years ago items are from the Recold Museum Library, maintained by Hy Jarvis, Recold Corp. president.

George A. Traver returned from the depths of the Terminal Storage Warehouse, New York City, with the year's most exhilarating discovery. Although he suffered from frost bite, he got rid of his hay fever. After learning that another individual had been cured of the ailment while working in a cold storage plant, Traver asked to be put in cold storage. He was numbed and blue when he came out, but for the first time in years his eyes were clear and his sniffles were gone. A matter of wide discussion now is that sanitariums with cold rooms for hay fever victims might be gold mines. Nervous neighbors might be annoyed by chattering teeth of the sanitarium guests, but soundproof floors and walls would remedy this.

A-E Stresses Close Control, Reliability Needed for Operational Minuteman Sites

LOS ANGELES — Indicative of the exacting conditions and reliability of environmental control systems required for missile operation are those that have been spelled out for the first Minuteman operational squadrons to be established soon by the U. S. Air Force.

Three underground launching sites are slated for the area surrounding Malmstrom Air Force Base near Great Falls, Mont., according to the Ralph M. Parsons Co., Los Angeles architect-engineer firm designing the facilities.

Recently the firm invited industry representatives to a meeting in Los Angeles to discuss design problems for the environmental control systems, which will have to maintain close control over temperature and humidity through a wide range of ambient conditions: 95°F d.b. and 70° w.b. in summer down to -40° in winter.

Reliability of the equipment is especially important, emphasizes the Parsons Co. It explains, "departure from a relatively narrow range of air temperature and relative humidity will result in an inoperable status," adding also:

"The reliability requirements for the environmental control systems establish a mean time between failure of 14,000 hours for these systems. Mean time between failures (MTBF) may be defined as the number of total hours of running time, without maintenance, for a system, or group of systems, divided by the total number of failures occurring during that time.

"It is believed that a system reliability of 14,000 hours MTBF can be attained using presently available commercial components. However, considerable care must be used in selecting these components, and some equipment may require a limited amount of upgrading," the firm suggests.

As now planned, the Parsons company explains, "the majority of the equipment will be housed in above-ground buildings, connected via ductwork to the underground structures. some air handling equipment will, however, be located in the buried structures.

"The equipment will be incorporated into factory assembled packages wherever possible in order to minimize field fabrication and installation work," the company also states.

Requirements differ somewhat for three different elements of the facilities: (1) launcher and launcher equipment room, (2) launch control center, and (3) electronic equipment in both the launcher and control center. These are listed by Parsons as follows:

Launcher and launcher equipment room:

Temperature: 70° plus or minus 10°.

Relative humidity: 60% maximum.

Cooling load: 54,000 Btuh at maximum ambient.

Heating load (at minimum ambient): 12 kw maximum preheat, 4.8 kw maximum reheat, 1.5 kw maximum room heat.

Supply air: 1,340 cfm total volume; 100 cfm outside air.

Launch control center:

Temperature: 75° plus or minus 2°.

Relative humidity: 45% nominal.

Cooling load: 100,000 Btuh at maximum ambient.

Heating load (at minimum ambient): 12 kw maximum reheat, 3 kw room heat.

Supply air: 2,800 cfm total volume; 140 cfm outside air.

Electronic equipment:

Supply air temperature: 55° plus or minus 2°.

Supply air relative humidity: 60% maximum.

Temperature rise through cabinets: 12°.

Pressure drop through cabinets: 1½ in. w.g.

Form Prototype Engineering Corp. As Consultant

MANVILLE, R. I. — Formation of Prototype Engineering Corp. here as consultant in air conditioning, refrigeration, and heating design and development was announced recently.

Louis J. Valois is president and treasurer of the company. He was formerly engineering assistant to Mr. Meek of Geo. W. Meek & Associates, Pelham, N. Y. Before that, he was assistant chief engineer of the residential air conditioning section of Worthington Corp. at Holyoke, Mass.

The new firm "acts as an extension of a manufacturer's engineering department having design and fabricating facilities of its own," the announcement pointed out.

WITT REMOTE AIR COOLED CONDENSERS

With The Low Silhouette

Efficiency, economy, dependability—those three words most effectively describe the operation of Witt Air Cooled Condensers. Available in a wide range of centrifugal blower and fan type models, for single or multiple compressor installations, for indoor or outdoor applications, you'll find a Witt Air Cooled Condenser to handle any size air conditioning or refrigeration system. Winter control systems available for low temperature areas —multiple circuiting available at no additional charge.

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By Frank Klein—Only $1.00 ea. Clip this ad and mail with your name and address to: Air Conditioning, Heating & Refrigeration News, 450 W. Fort St., Detroit 26, Mich.

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The only molded core made by ceramic bonding of highly efficient desiccant particles. All inert fillers are removed by ceramic fire completely activating the core. Permits maximum flow and depth filtration at minimum pressure drop. Dryness assured by Abso-Dry® pressure sealing and Brass Flare Nuts.

CAPACITY RANGE R-12 up to 20 TONS
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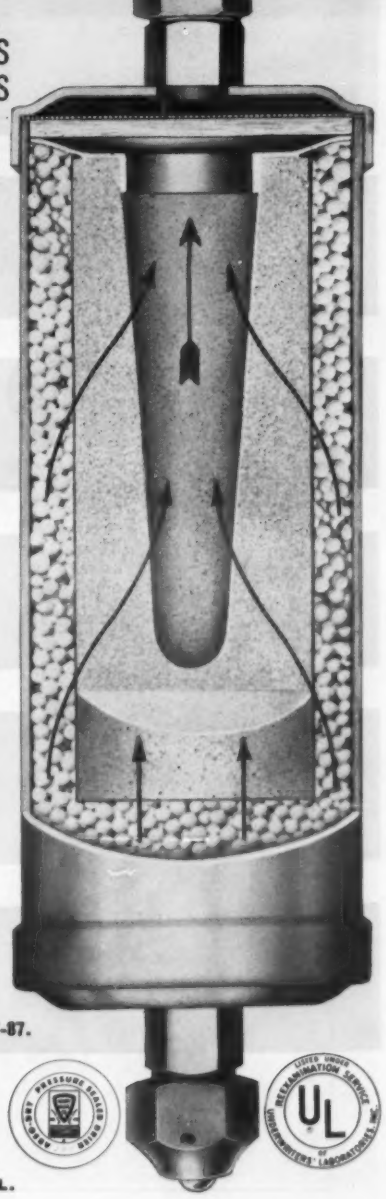
DRI-COR Advanced Molded Core
Design Provides Uniform Core Porosity
No Inactive Cement or Binder

DRI-COR Two Stage Drying
Progressive Filtration . . .
500 P.S.I. Working Pressure

DRI-COR Drying And Filtering
Properly Proportioned . . .
Complete range of sizes

DRI-COR Low Pressure Drop
Transverse Flow for Rapid Moisture and Acid Adsorption

DRI-COR Pressure Sealed
Permits Continued Desiccant Reactivation Prior to Use



Also Available in Replaceable Cartridge Types . . . Write for DRI-COR bulletin V-87.

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Cooling at Cape Canaveral

Without Air Conditioning It Would Be Impossible To Operate Air Force Missile Test Center

By C. Dale Mericle

CAPE CANAVERAL, Fla.— Without air conditioning it would be impossible to operate the Air Force Missile Test Center here, and some missiles, such as the "Titan," couldn't get off the ground without it.

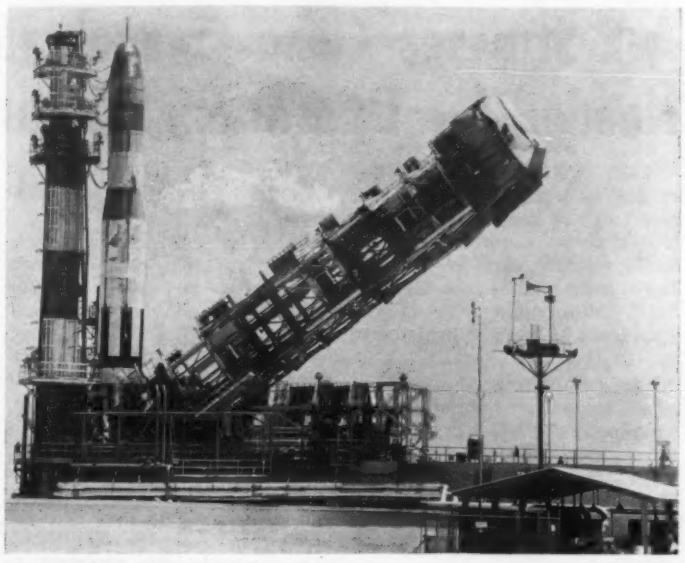
So perhaps it's not surprising that there are some 850 air conditioning units totaling approximately 6,700 tons capacity at the launching areas here, plus another 650 tons of refrigeration including, for example, 460 drinking water coolers.

All the above are installed just on the 15,000-acre cape, which is known officially as "Cape Canaveral Missile Test Annex."

How much more air conditioning is involved in the rest of the Test Center might be difficult to determine accurately. Much air conditioning is required at Patrick Air Force Base (which operates the Test Center) located 15 miles south of the Cape Test Annex. Here, for instance, some 1,650 Capehart and Wherry housing units are equipped with individual heat pumps.

The Center is responsible for operation of the Atlantic Missile Range, which is comprised of Cape Canaveral, the launching site, and 11 down-range tracking stations extending 5,000 miles southeasterly in the Atlantic ocean to Ascension Island, not to mention ocean range vessels used in tracking.

Primary purpose of almost all the air conditioning in the Test Center is to cool and dehumidify air for the electronic equipment, both on the ground and in such complicated missiles as the Titan, although with the latter it's also required to protect parts of the "bird" from damage due to excessive cooling when it's being fueled with "lox" (liquid oxygen) at -297° F.



CONDITIONED air to protect delicate electronic equipment in the mighty Titan missile before and during test launchings is piped from package unit beneath roof at lower right. "Cradle" or work tower is being lowered to horizontal preparatory for launching.

* * *

Providing efficient working conditions for personnel involved in missile testing is another function of air conditioning here, but it is of secondary importance.

Design criteria for air conditioning of electronic equipment, however, likewise result in reasonably comfortable temperature and humidity conditions for personnel.

"We generally design for 75° plus or minus 5° with a maximum of 50% r.h. for instrumentation," explains Jewell Thompson, air conditioning chief at Patrick AFB, but some applications require control to within ½°.

Operations Requiring Air Conditioning

Air conditioning is required for almost every phase of operation at the Test Center. On the cape itself these can be listed in logical sequence as:

1. **Industrial Area.** When missiles are delivered to the cape they go first to this area where there are 19 large missile hangars and supporting facilities to check out components and complete final assembly. All these buildings require air conditioning.

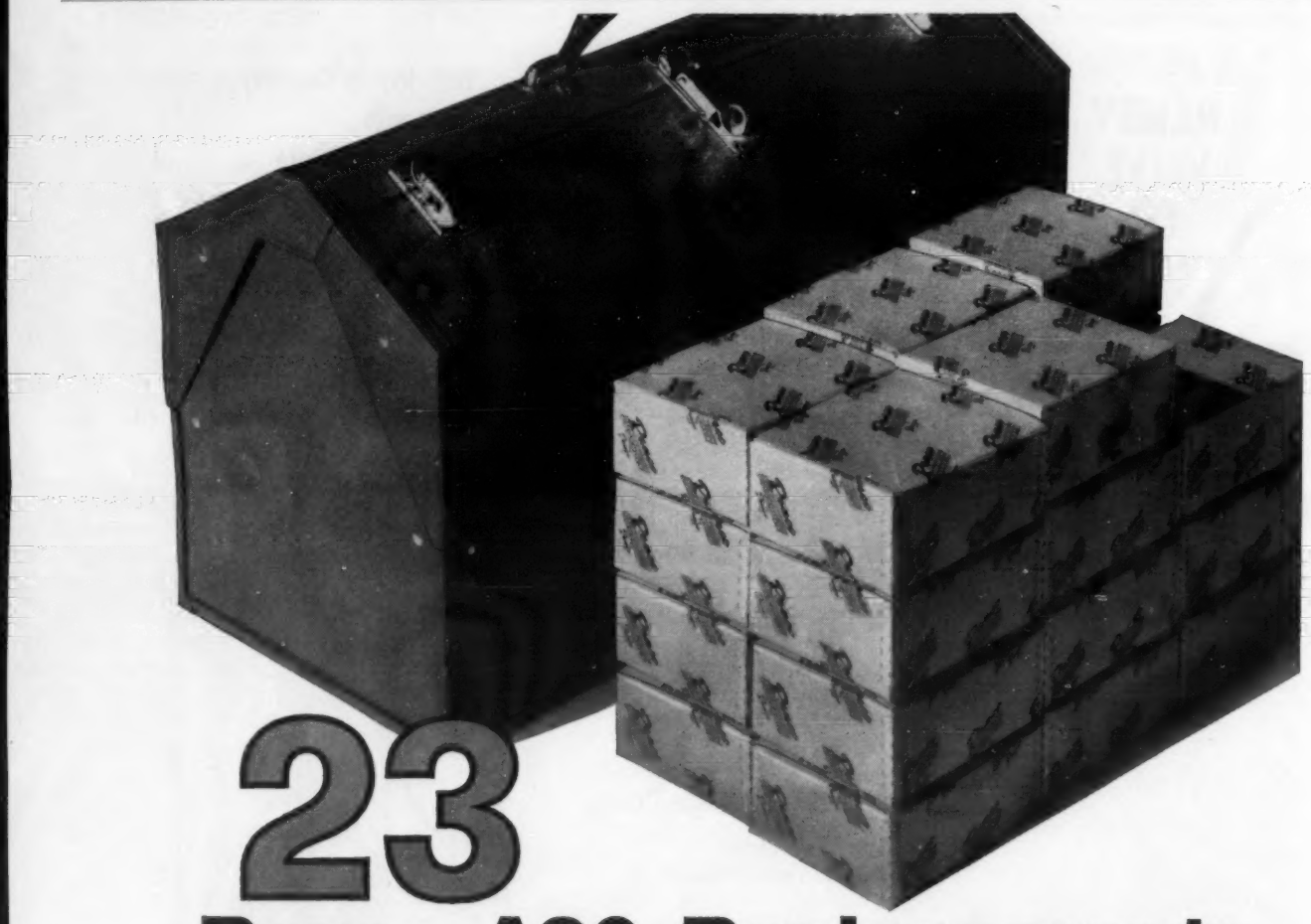
2. **Missile.** Such missiles as the Titan require air conditioning before, during, and after launch.

3. **Launching Pad.** There is a considerable amount of electronic and other equipment installed in the pads used for such complicated missiles as Atlas and Titan. Air conditioned, of course.

4. **Blockhouse.** Actual launching is controlled from this structure, usually located about 200 to 300 yards from pad proper. Filled with electronic equipment, and personnel during a launch, it requires air conditioning.

5. **Central Control.** Loaded with instrumentation, this is the "nerve center" of the entire Missile Test Center. It coordinates pre-launch activities, takes over missile control immediately after launch. Air conditioned.

6. **"Azusa."** This is an electronic tracking system installed



23

Ranco A30 Replacements

take up less space than your tool kit,
yet do the work of 1000 exact replacement controls

It's a fact! Only 23 basic controls and installation packages . . . and you're in business to handle 9 out of every 10 replacement control calls. Now you can carry an inventory of refrigeration and air conditioning controls right in your truck for on-the-job control replacements and eliminate costly, time-consuming trips back to your shop or wholesaler. That means you service more units each day, increase your weekly dollar volume, build more customer satisfaction.

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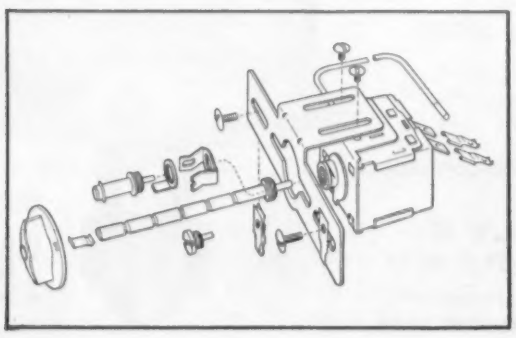

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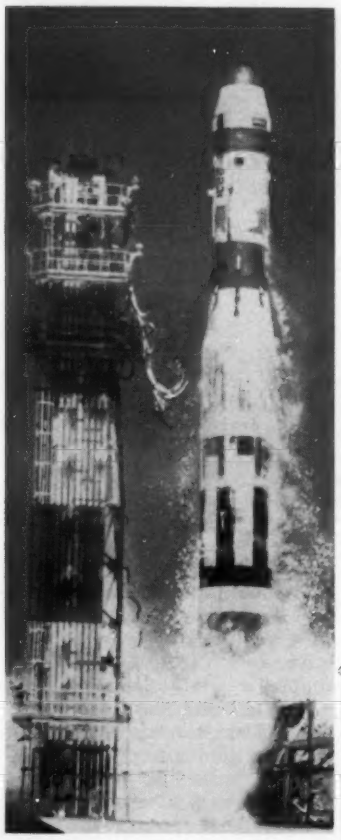


WHEN Titan gets some 30 to 40 in. off the pad, the flexible ducts as well as the electrical cables are automatically disconnected and fall out of the way. Picture on page one shows flexible ducts connected to Titan.

* * *

at two sites on the cape which collects continuous precision data on position and speed of missile in flight. Air conditioned.

7. Telemetry. Measurement data on many functions in flight is radioed back from missile to two telemetry centers for recording on tape. These facilities are air conditioned.

Support Facilities Also Need Cooling

In addition to the above seven areas directly concerned with missile testing which require air conditioning, there's also air conditioning for such obvious support facilities as laboratories, cafeterias, etc.

A visitor to Cape Canaveral may be surprised by the variety of air conditioning systems and equipment he finds. Some of this variety results from the many differing and exacting requirements of the applications, but some probably is the result of the complicated organizational structure involved.

The Air Force Missile Test Center is under military control, being a responsibility of the Air Research and Development Command of the U. S. Air Force.

The military chain of command includes the AFMTC staff, the 6550th Air Base Group, the 6560th Operations Group (range support), and all organizations at Patrick AFB involved in helping run the range for the benefit of its users. The latter include the Army, Navy, Air Force, and National Aeronautics and Space Administration, all of which maintain field organizations at AFMTC.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

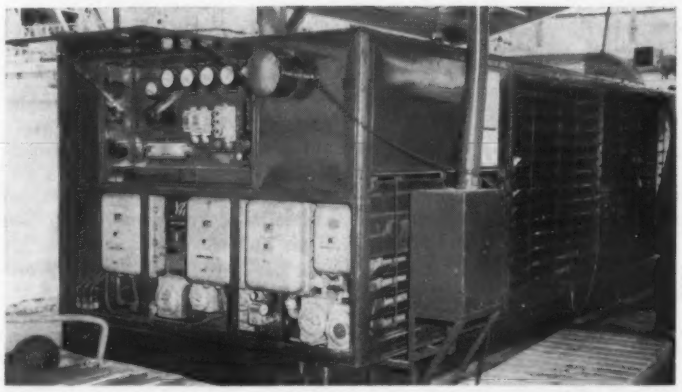
Actual maintenance and operation of the Atlantic Missile Range, including the down-range stations, is handled by Pan American World Airways, Inc., as the prime contractor to AFMTC, with Radio Corp. of America as the chief subcontractor for the technical work. Both maintain facilities and equipment at the Test Center.

Major Manufacturers Maintain Field Stations

Major manufacturers of missiles and components also have field stations at the Test Center. Included are such firms as Boeing, Douglas, Lockheed, Martin, Convair, General Electric, Avco, Rocketdyne, Northrop, and many others.

Numerous governmental agencies besides the Air Force also have organizations here as well.

All the above represent quite a variety of "customers" for air conditioning that have to be satisfied.



COMPLEX air-cooled package unit under roof near launching pad supplies tempered air at low humidity to the Titan itself. Just to the right (but not shown here) is a somewhat similar package unit which produces chilled water for air conditioning the two-story pad, filled with electronic and other equipment.

Design Problems At Cape Canaveral

Before describing any specific applications, it would be well to outline briefly some of the general design problems faced at Cape Canaveral.

Air conditioning systems must be designed to produce their rated output at ambient temperatures as high as 125°.

All outdoor equipment must be designed and anchored to withstand hurricanes. This means it must hold up against 125 mph winds.

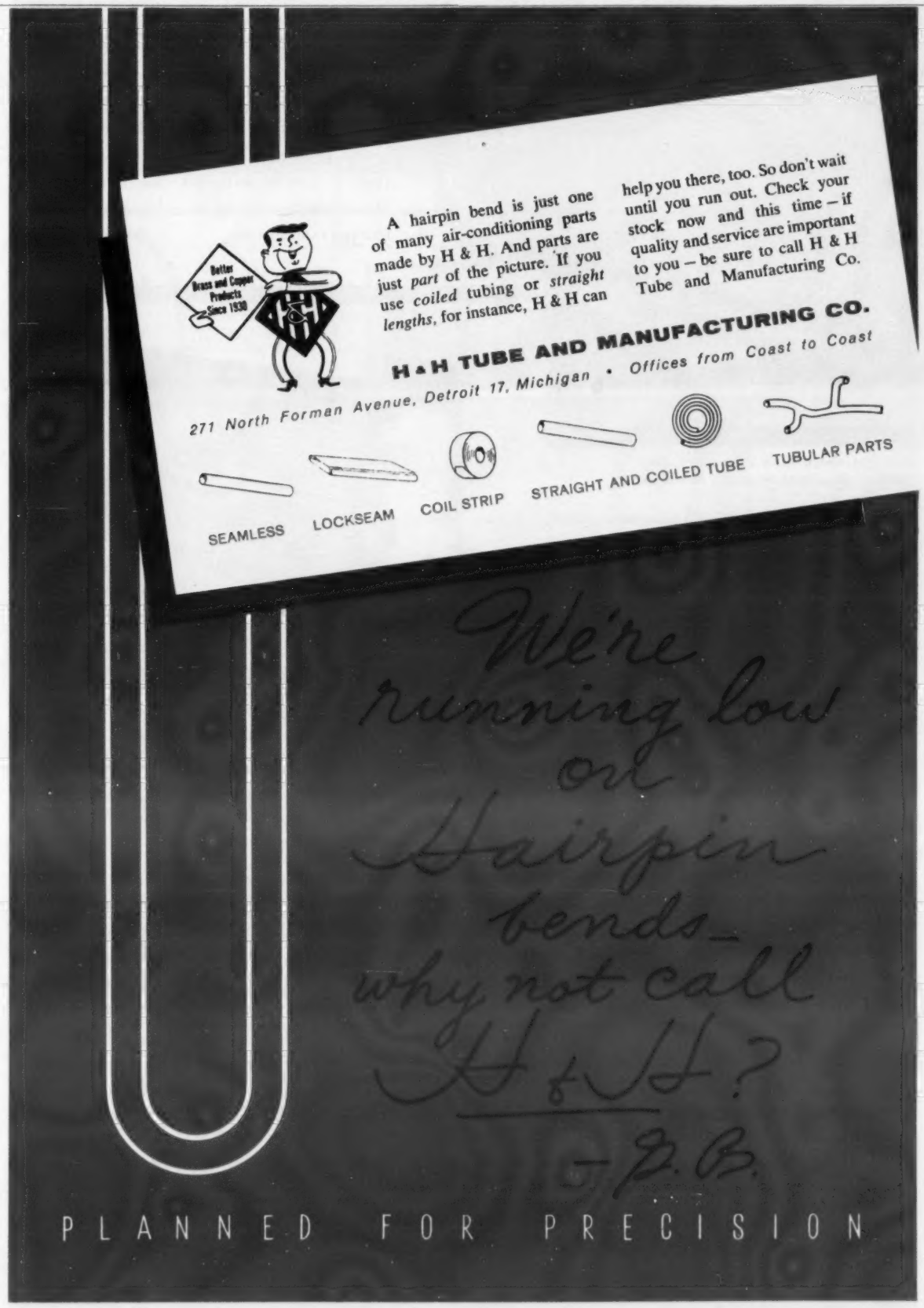
Corrosion is a severe problem, especially for condensers, both air and water cooled.

As Col. Colie Houck, AFMTC Deputy Chief of Staff for Installations, explains, "This area lies in about the center of a 100-mile stretch of Florida coastline that is subject to extremely corrosive salt air."

This presents problems for all types of equipment, especially air-cooled condensers, not to mention the electronic equipment which air conditioning is intended to protect.

But if the salt air is bad, the water on the cape is perhaps even worse. It's extremely hard, among other things, so there's plenty of trouble with water-cooled condensers.

(Continued on next page)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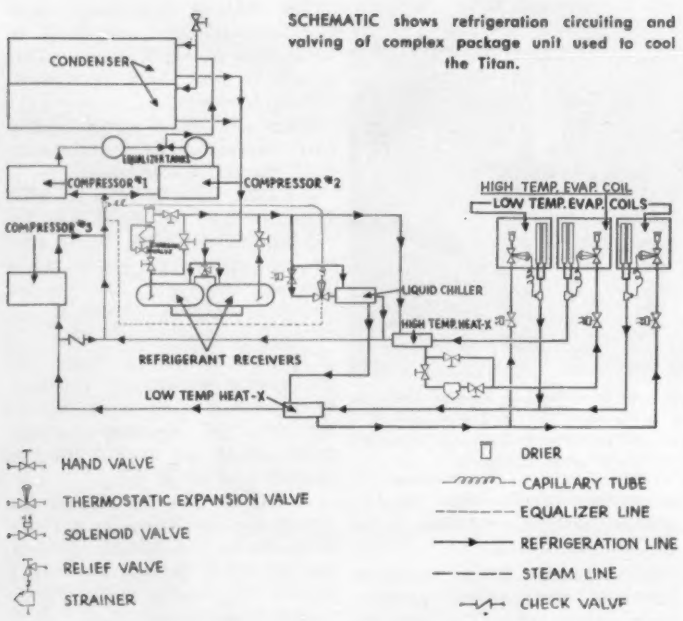


SCHEMATIC shows refrigeration circuiting and valving of complex package unit used to cool the Titan.

Cape Canaveral--

(Continued from preceding page)

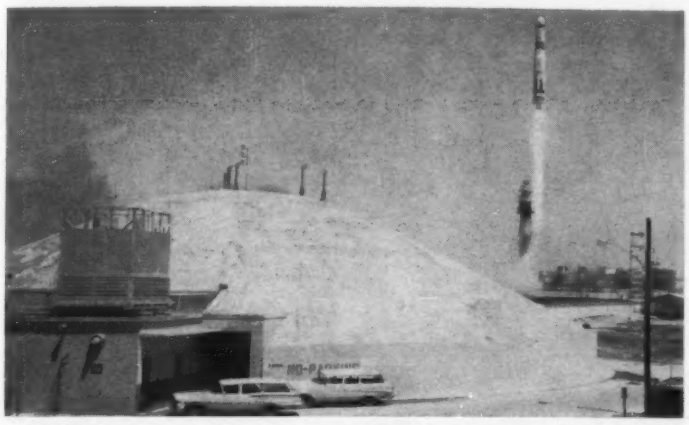
In fact, the trend now is definitely to air-cooled condensers at the cape, according to previously mentioned Thompson.

"We are now using air-cooled condensers in sizes up to 40 tons, and we are changing a lot of small water-cooled systems to air," Thompson disclosed.

Corrosion not only presents problems in design but in maintenance and repair operations as well. This important phase of air conditioning at Cape Canaveral will be discussed later.

Air conditioning of the Industrial Area facilities where missiles are received and checked before going to the launching pads involves few special problems other than those applying generally to the whole cape area.

Of more general interest and possibly more significance is the air conditioning required for the missiles themselves and the launching, control, and telemetry facilities.



BLOCKHOUSE with walls 6 ft thick house electronic equipment and technicians to control and observe a Titan launching. During final stages of count-down it is sealed off tightly and the 100-ton air conditioning system operates on 100% recirculated air. Note cooling tower at left on roof of machinery room.

The Titan would be a prime example.

It should be pointed out here that many of the smaller missiles, particularly those using a solid fuel, are comparatively simple in design and so, likewise, are their launching facilities. Except for the blockhouse, air conditioning may not be required in the "launching complex" for such a missile.

Perhaps it would be well at this point also to re-emphasize the fact that Cape Canaveral is a *test* center and the No. 1 establishment for launching satellites and space probes rather than a combat base. Thus there are extensive facilities for checking and recording information on missile performance that probably wouldn't be found in such profusion at a combat base.

Air Conditioning For the Titan

Air conditioning is essential for the Titan, built by The Martin Co. A huge two-stage missile 98 ft long, it weighs 110 tons when fully fueled. Combined thrust of both stages is 380,000 lbs, and the range is said to be more than 8,000 miles.

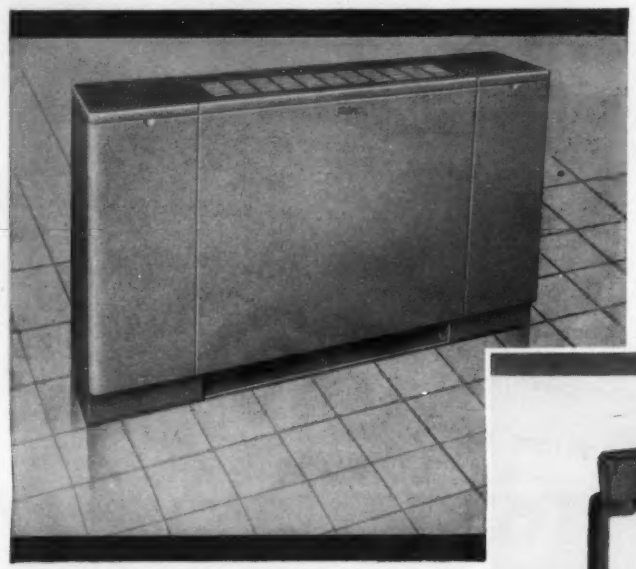
At launch, after being held on the pad for about four seconds, the Titan rises vertically and then arches over into a curving trajectory. When the missile has attained a speed of about 5,300 mph, the first stage engine cuts off, and separation of the second stage from the booster occurs. Shortly thereafter, following ignition of the second stage, powered flight continues up to speeds of about 17,000 mph.

After the second stage engine cuts off, vernier nozzles on the second stage provide thrust. These verniers are designed to adjust velocity and correct the ballistic trajectory for proper delivery of the nose cone.

Nose Cone Separates

Then the nose cone, or "reentry body" as it is officially called, separates from the second stage and continues in a free-fall path to the intended target. The nose cone reaches a peak altitude of about 500 miles on a flight of intercontinental range.

The Titan maintains a predetermined course, prior to cutoff of all its engines, which puts it on a ballistic trajectory, by means of its guidance system. If the missile begins to roll or drift off its course during powered flight, an autopilot moves or "gimbals" the engines



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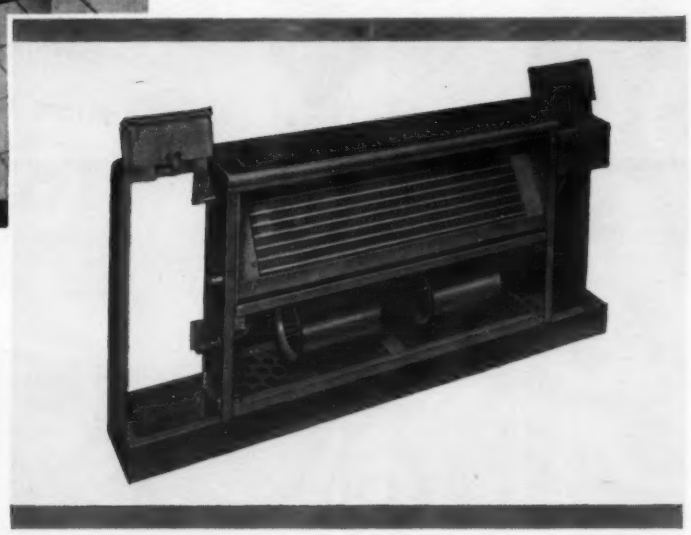

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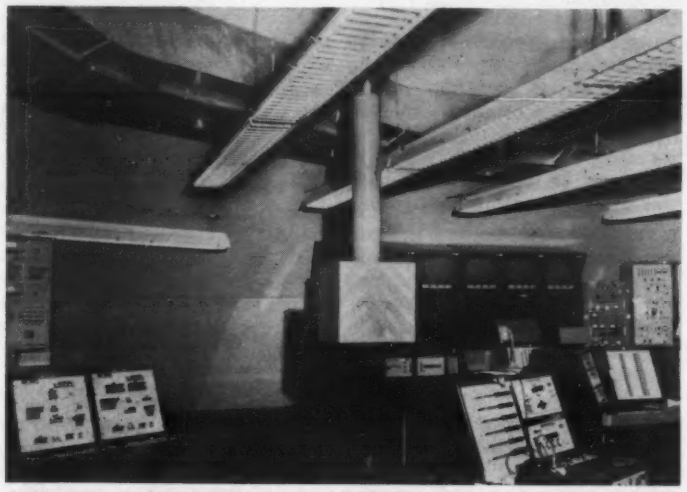

COOLED and dehumidified air in huge quantities is dumped into main control area of blockhouse from outlets running almost full length of duct which circles ceiling.

and adjusts the position of the four vernier nozzles.

The autopilot receives its steering commands from the guidance system carried in the second stage.

Although the first operational Titans being supplied to Air Force squadrons will have a combination radio-inertial guidance system requiring control from the ground, later models will have an all-inertial system putting the Titan entirely on its own after launch.

The Titan, which is intended to augment the manned bomber, the Atlas, and the Snark missile forces of the Strategic Air Command, is being planned into operational squadrons and bases.

Cooling Required For 3 Compartments Of Titan

Conditioned air is required for three compartments of the Titan: the guidance bay, the telemetry bay, and the "sustainer" or second-stage engine compartment.

When the Titan is merely standing on the pad or is being tested on the pad, air at 30° and 15% rh is supplied to all three compartments through round, flexible ducts that along with flexible electrical cables are called the "umbilical cords" of the missile.

Prevents Damage to Electronic Equipment

Chief purpose of air conditioning the Titan during these waiting or pad-test periods is to prevent damage to intricate electronic and mechanical equipment from corrosion. Thus, the unusually low humidity requirement.

Low humidity is still a requirement when the Titan is being fueled with liquid oxygen for launching, but another problem enters the picture now: that of protecting vital parts of the missile from damage due to the -297° "lox." So, 120° air is fed to the sustainer engine compartment and 70° air to the telemetry bay, while the guidance bay continues to get 30° air.

Air at these temperatures is supplied to the Titan even during launch. The "umbilical cords" stay connected to the missile until it has ascended from 30 to 40 in. off the pad. At this point a combination of mechanical and pneumatic force automatically disconnects the flexible ducts and cables from the Titan.

Air conditioning continues to be required for the first few seconds or minutes of flight, but the "lox" and the firing of the engines provide obvious sources of cooling and heating. At altitude the air is so thin there is no problem.

Circulation of the conditioned air supplied to the Titan is augmented within the missile itself by various components which are equipped with their own blowers.

Source of the conditioned air for the Titan is one of the most complex "packaged" units ever devised. It rests on a concrete slab a few feet from the launching pad. Beside this unit there stands a somewhat similar "packaged" unit supplying chilled water for air conditioning rooms in the pad itself.

A roof protects these two units from the weather to a certain extent, but all four sides are open, as with a "car port."

The Titan air conditioner, built by Elliott Engineering Co., Inc., Lynwood, Calif., was described in great detail in the May 25, 1959, issue of the NEWS, and service instructions and a trouble-shooting chart on this unit appeared in the NEWS in the issues of March 7, 14, and 21, 1960.

To summarize very briefly the previously published material, the Titan unit "package," which is mounted on steel I-beam skids, includes a 12-cylinder compressor and two 8-cylinder compressors, all hooked up in a

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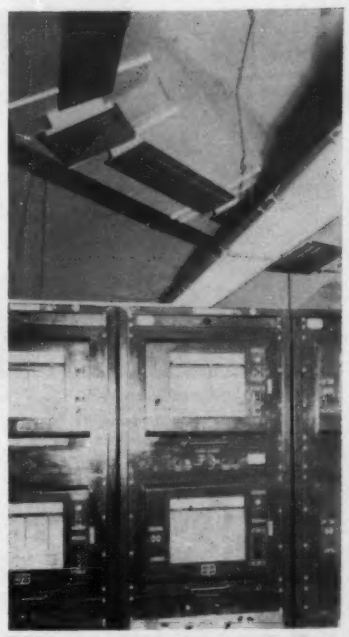
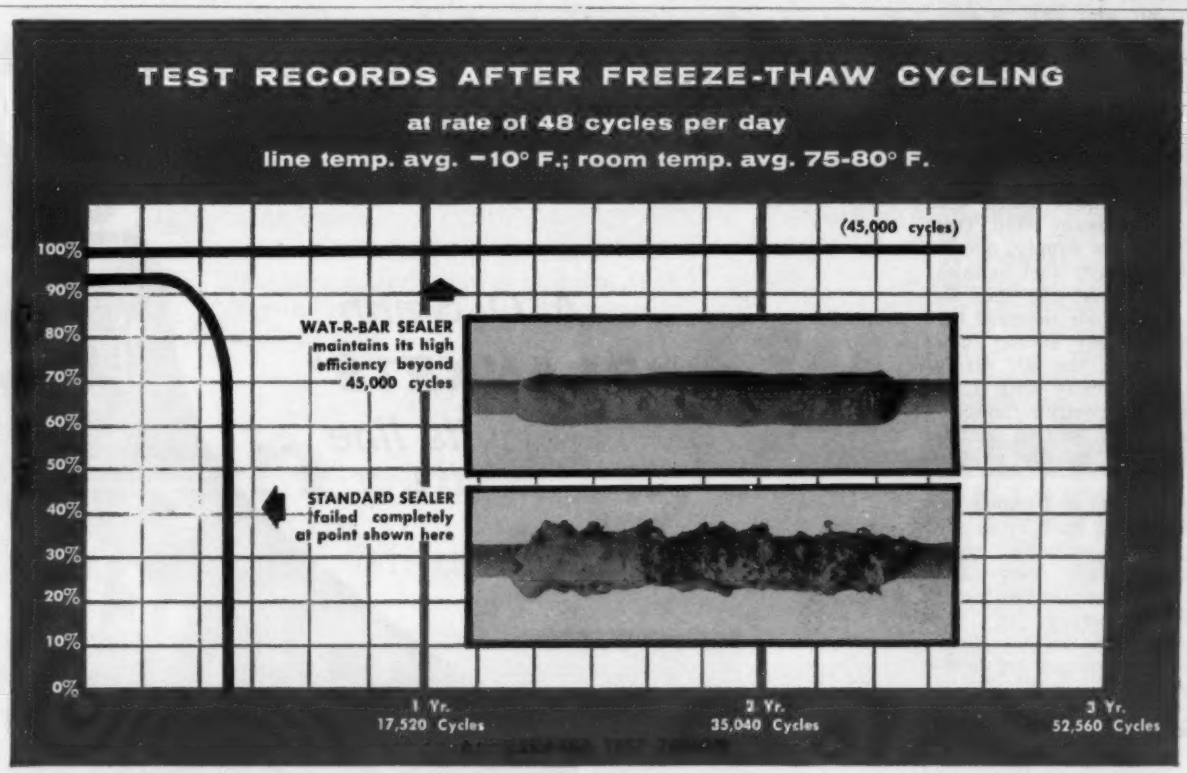


BOTH square and rectangular registers are used in ceiling duct of blockhouse.



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NERVE center for missile tests at Cape Canaveral is Control Control which coordinates all activities and is responsible for destroying missiles that veer off course. Dual 100-ton chilled water systems (one is a standby) cool and dehumidify air for electronic equipment and personnel.

Cape Canaveral--

(Continued from preceding page)

two-stage system, and an electrically fired steam boiler.

Built-in air-cooled condensers are employed.

Air at 30° and 120° is supplied to the Titan from this conditioner at the rate of 250 lbs a minute against an external static pressure of 40 in. water.

Three insulated round ducts run between the conditioner and the missile, the final connections to the missile being the flexible ducts already cited. Two of the ducts are supply, one is return. One supply duct handles 30° air, the other, 120° air. To achieve the 70° air required for the telemetry bay during fueling and launch, the 30° air is mixed automatically with 120° air in the supporting "umbilical" framework section standing beside the missile at the pad.

Control system and numerous other aspects of this Titan air conditioner are extremely complex, and they fully deserve the detailed and separate treatment previously received in the NEWS, to which readers desiring more information are hereby referred.

Launching Pad Unit Isn't So Complicated

The "packaged" unit supplying chilled water for air conditioning of the launching pad isn't so complicated as the Titan unit. It is an air-cooled system using two 50-ton compressors. This one was built for Martin by C. G. Hokanson Co.

As seen in the average photograph or viewed from a distance, the launching pad for a missile like the Atlas or Titan appears to be nothing more than a mass of concrete and an Erector-set collection of structural steel.

These elements certainly dominate the scene, but they comprise merely the skeleton of the pad which, with its blockhouse, is usually referred to as the "launching complex."

(While the word "complex" seems overworked nowadays, when applied at Cape Canaveral it is usually an understatement.)

The pad for a Titan at the Test Center is an elaborate affair. There's the long ramp, for example, on which the missile is trucked up to be placed in the "cradle" that erects it into vertical position for testing and firing. Extending several stories in height and equipped with numerous work platforms and two elevators, the erector-type cradle is lowered to the horizontal position for launching of the Titan.

2 Floors In Base of Pad Require Cooling

There are two floors in the base of a Titan pad, filled with electronic and other equipment, most of which needs air conditioning.

On the ground floor, for example, there is a 5-ton air conditioner supplied with chilled water from the previously mentioned "packaged" unit, which provides cooling for some electronic equipment plus a big transformer and power panel.

Another air conditioner on the same floor, a 15-ton unit, is located in the area occupied by two hydraulic control panels. Each of these hydraulic control systems has a compressor of 50 hp, and the hydraulic oil temperature rises to 130°, contributing to the sensible air conditioning load within the pad.

On the second floor of the pad are two more air conditioners. One is a 10-ton unit equipped with resistance strip heaters for reheat; the other is a 15-ton unit. Primary function of both is to air condition electronic panels.

Also part of the air-handling system in this pad is a powerful fan driven by a 50-hp motor which keeps the pad interior under positive pressure. This is to prevent or minimize damage from fire should a missile blow up on the pad during launch.

The blockhouse is an integrated part of the launching complex, for here the actual launching procedure is controlled. Located some 200 to 300 yards from the pad, the blockhouse is a dome-shaped structure with walls of reinforced concrete 6 ft thick and steel doors 2 ft through.

Such protection is deemed necessary in case a missile explodes on the pad (as a few have done) or some "malfunction" drops a missile on or near the blockhouse after launch (which has never happened, although one did fall harmlessly back on the cape).

For these reasons a blockhouse is sealed tightly during the final stages of countdown, and the air conditioning system operates on 100% recirculation.

Filled with rack after rack of electronic equipment, the blockhouse also contains closed circuit television receivers and submarine type periscopes for visual observation of the launch pad. During a countdown as

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many as 100 or more technicians and official observers will occupy the blockhouse.

Two 50-ton Carrier compressors supply the chilled water required for air conditioning a typical Titan blockhouse. These are located in a machinery room at the rear. A cooling tower is installed on the roof directly above. Also in the machinery room is a big diesel-electric generator set which is operated during a countdown to supply all the power required for the launching complex to make sure there is no interruption due to external power failure.

Both Systems Used During Countdown

The two compressors and their chillers are operated in steps, one supplying 50° chilled water, and the other designed to go down to 42°.

Ordinarily one system takes care of the load, but during a countdown both systems are likely to be operating because both equipment and occupancy loads are then at their maximum.

There are two floors in the blockhouse. The first floor is devoted primarily to offices and repair shops. It is cooled by three large air-handling units discharging directly into the space without ductwork.

Upper floor houses the electronic equipment for remote control of the launching procedure, and here most of the people work during a countdown. Ceiling is dome-shaped. Extending almost the entire circle, an exposed duct is attached to the ceiling and is fitted with almost continuous registers for its length.

Thus, tremendous quantities of conditioned air from air handlers located on the first floor are dumped into this large area.

Electronic equipment racks that are especially sensitive to heat are equipped with their own blowers which pull the conditioned room air through the racks.

Air conditioning system of the blockhouse is controlled by room thermostats and humidistats with thermostats in the chilled water discharge lines cycling the compressors. The room thermostats, so located as to respond to return air temperature, control three-way modulating valves in the chilled water supply to the air handlers and also adjust face and bypass dampers. Electric (strip) re-heat controlled by room humidistats holds humidity down to a safe level.

Because the blockhouse system operates on 100% recirculated air with a heavy occupancy load, especially during a count-down, activated charcoal filters are provided in the return air to minimize odor problems.

Central Control Building Needs Cooling Chiefly For Electronic Equipment

Central Control, the nerve center of the entire missile test operation, is located in a building on the cape remote enough from all the launching pads so that it doesn't need the structural protection of a blockhouse. It does need air conditioning, however, and again chiefly for all the electronic equipment involved.

Although Central Control coordinates all the many activities involved in testing a missile, its primary function might be considered as safety.

Keeping in constant touch by cable or radio with all the down-range tracking stations, ships, and planes, Central Control gives the final okay on a missile launch. Once the missile has left the pad, Central Control takes over.

TRACKING of position and velocity of missiles in flight is accomplished by the exceptionally accurate "Azusa" system involving a digital computer and a set of radar "bubbles" like the above. Individual radomes (there are eight at each of two installations)) each have air conditioners equipped with electric reheat for precise control of temperature and humidity.

If the missile veers from its prescribed path as shown on the various tracking panels in Central Control, the range safety officer here throws the destruct switches which cause the missile to blow up and fall harmlessly into the ocean.

Central Control also coordinates the tracking data picked up by the Azusa installations as well as information obtained through telemetry.

Air conditioning for Central Control is provided by dual 100-ton capacity chilled water systems, one system serving as a standby. The two Carrier 100-ton compressors and the chillers are located in a separate machinery building close to the main structure. There's a cooling tower on the roof of the machinery building.

Conventional air handlers, ductwork, etc., are used, and heat-sensitive electronic equipment racks have their own air circulating systems to pull the conditioned room air through the racks.

Before going into any detail about air conditioning for the Azusa and telemetry installations at Cape Canaveral (the down-range stations also have somewhat similar tracking and telemetry equipment), it might be well to review a few official Air Force views on the general subject:

Instrumentation 'Most Sophisticated'

"The instrumentation needed to gather missile flight data at the Atlantic Missile Range is the most sophisticated of its kind in the world. It is designed so that at precisely any given instant the performance of a missile can be determined.

"From a cost standpoint, this instrumentation represents a major portion of the Center's half-billion dollar plus capital plant investment. With it, the number of launchings required from prototype to operational missile in a given program have been reduced to a mere fraction of what they were less than 10 years ago.

"The primary purpose of the Center's flight tests is to record the performance of missiles under the most exacting laboratory conditions. During lift-off and up to about a mile from

(Continued on next page)

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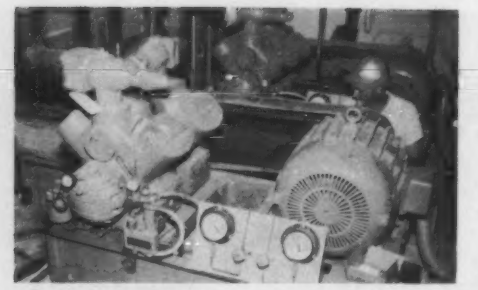

THESE two compressors are nearing final stages of installation in second and newest Azusa tracking complex.

"TELEMETRY" (i.e., collecting and recording data from missiles in flight) could well be described as the chief purpose of the Cape Canaveral missile test activities. Extremely close and steady control of temperature and humidity is required for electronic equipment like the above in the newest telemetry building lest readings be thrown off and the test wasted.

Cape Canaveral--

(Continued from preceding page)

the launch pad, it is relatively easy to measure a missile's position to an accuracy of inches by using high-speed cameras. Beyond this point, and up to 15 miles, theodolites and long-range cameras are used for an accuracy within about 30 ft.

"However, the problem becomes far more difficult when the missile reaches an acceleration of from 10,000 to 16,000 mph at altitudes of several hundred miles. For these a system called Azusa is used. Azusa provides what has been called the ultimate in electronic phase comparison techniques.

"Located at Cape Canaveral, the Azusa system can collect precision data on missile position and velocity at the rate of 10 impulses per second with exceptional accuracy. This information is gathered by eight ground antennas housed in pressurized radomes. It is then fed into an IBM high-speed digital computer.

"In addition to the velocity and the position information, Azusa is also used for safety purposes since it provides a continuous prediction on where a missile will impact at any given instant should its flight be terminated.

Telemetry Principle

"However, it is telemetry which is the primary means used to obtain missile flight data. Up to 75% of the information gathered during a missile flight test is obtained by telemetry.

"The principle of telemetry is comparatively simple. It consists of small radio transmitters placed inside the missile which send information on as many as 75 separate functions on each flight. This information is picked up by receiver stations where it is recorded on magnetic tape. Thus, long after the actual flight the Center can re-fly a missile in the laboratory again and again.

"Examples of some of the information obtained through telemetry include missile attitude, altitude, battery voltage, temperature, vibration, and acceleration."

There are actually two Azusa ground installations at Cape Canaveral, the second just being put into operation. Each of the eight radomes in each installation requires cooling and humidity control.

Two Types of Cooling Systems Employed

Two types of air conditioning systems are employed. One type is a self-contained direct expansion air conditioner of 7½ hp. Other type is a fan-coil unit using chilled water from a central system. Electric strip reheat is provided in both types of units to control relative humidity. The units (both self-contained and fan-coil types) are mounted on wooden platforms about 6 ft high adjacent to the radomes and are connected to them through short lengths of ductwork.

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Q THE PROFESSION: *What is air engineering? What does it mean to you?*

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A He is a member of an increasingly vital profession. He deals with problems of air. He is involved wherever combustion, chemical or mechanical processes or natural causes create smoke, dust, heat, cold, fumes or odors hazardous or annoying to personnel or the community or damaging to property or products. Air Engineers as a group are men of many titles. The Air Engineer may be any one of these . . .

- *an engineer or executive* in an industrial plant or commercial establishment, a utility or an institution in which his primary function is the handling and treatment of air.
- *an industrial hygienist* concerned with the reduction of airborne hazards to the health of personnel.
- *a registered consulting engineer or architect* concentrating on the problems of air in new or existing facilities.
- *a mechanical contractor* specializing in air handling installations.
- *a Government authority* cooperating with industry to effect compliance with codes and regulations governing the purification of air.

Q THE MAGAZINE: *How does it serve the profession?*

A *AIR ENGINEERING* is the *only* professional magazine dedicated to helping the Air Engineer fulfill his vitally important mission of creating pure air environment.

AIR ENGINEERING'S editorial objectives are, in brief: 1) to give readers up-to-date, practical working information useful in coping with air problems and 2) to bring together in closer communication fields and industries concerned with the handling and treatment of air.

Another, and valuable function of *AIR ENGINEERING* is to help you, the manufacturer, move equipment and materials in this important, dynamically-developing field.

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tral source at the site is piped to each radome to inflate the "bubble."

Considerable air conditioning is also required for the control panel setup used with the second Azusa installation.

Telemetry Building Requires Most Precise Control

Nowhere on Cape Canaveral is more precise control of air conditions required than in the telemetry buildings, however. In the final analysis, this is what the Missile Test Center is all about: collecting and analyzing internal data radioed by the missile while it's in flight.

Not only must temperature and humidity be maintained at optimum levels (76° and 50% rh), but these conditions must remain steady for successful telemetry. Rapid changes in temperature will change resistor values, thus throwing off readings received from the missile and perhaps making the whole test worthless.

To achieve these conditions in the newest telemetry building at the cape there's a high-speed York 150-ton centrifugal compressor driven at 11,301 rpm. This furnishes cooling for chilled water supplied to five air-handling units.

Reheat Needed for Humidity Control

Reheat is needed for humidity control. Some of this is furnished by a small (10,000 Btu) oil-fired boiler, but the heat from the electronic equipment in the building is captured and used also for reheat purposes.

The five air-handling units supply the conditioned air to the space through overhead ducts and ceiling outlets. Here again, blowers in electronic equipment racks pull the conditioned air from the space up through the racks.

Return air from the racks, however, is piped into return air ductwork directly overhead. Another return air system handles the rest of the air from the space.

In a mixing plenum of the main air-handling unit return air from the equipment racks is blended with either or both return air from the space and outside air in varying proportions to maintain the desired conditions.

The control system for this installation is rather complex, involving electric, pneumatic, and electronic controls.

Such complicated systems represent a major problem in maintenance of air conditioning and refrigeration equipment at Cape Canaveral, according to H. L. Wagg, who heads up this activity for Pan American, the prime contractor.

The fact that most of the equipment and the applications are highly specialized industrial types with 85% of them using pneumatic controls also means that competent civilian maintenance personnel is hard to find, Wagg laments.

"But Cape Canaveral does offer a serviceman a terrific opportunity to learn all about complicated systems," he's convinced.

As for specific types of service problems, Wagg blames corrosion for about 25% of their troubles.

Air-Cooled Units Hardest Hit by Corrosion

Hardest hit by corrosion, perhaps, are air-cooled condensers which, as mentioned earlier, are widely used, chiefly because of exceedingly poor water conditions on the cape.

The combination of salt air, aluminum fins, and copper tube apparently results in severe electrolytic action on condensers, Wagg believes.

"Normally the salt collects on the fins, and this is okay until we get a hard rain. The rain then washes the salt down the condenser fins where it seems to collect in concentrated form on the bottom two or three rows. Here the concentrated salt soon loosens the bond between the fins and tubes," Wagg explains.

"Under the worst conditions, depending on nearness of the condenser to the shore and the amount of rain, a condenser will be gone in two years or less, as far as its efficiency is concerned. With many of our jobs calling for temperature control to within ½°, even small losses of condenser efficiency are quite critical," he claims.

Hosing with Fresh Water Lengthens Life of Air-Cooled Condensers

Substitution of all-copper condensers to prevent electrolytic action has been suggested, but in the meantime Wagg has initiated a program that calls for a thorough hosing with fresh water under pressure every week for all air-cooled condensers on 5-ton and larger systems.

"This seems to lengthen condenser life considerably," Wagg comments.

One manufacturer, he also pointed out, seems to be having success with the experiment of locating an aluminum filter in the airstream just ahead of the condenser. The salt is trapped in the filter, which can be easily replaced as needed.

Meet To Organize Black Hills RSES

RAPID CITY, S. D.—Nineteen refrigeration service engineers met recently to organize a Black Hills Chapter of RSES.

Donald Johnson was named temporary president with Vern Green elected to the secretary-treasurer's position.

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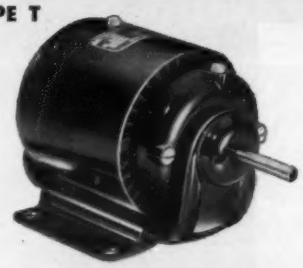

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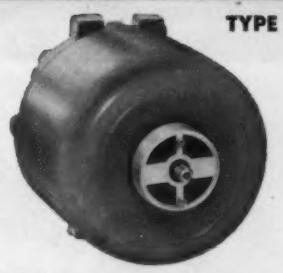

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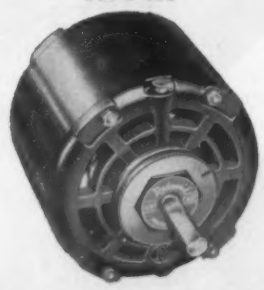

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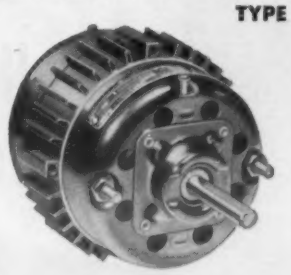

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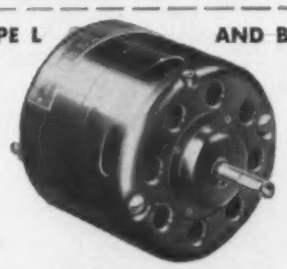
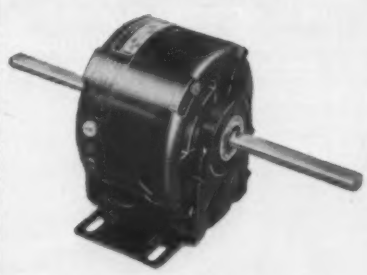


Accepted by the industry as standard for low-powered applications, such as fans, small appliances, and aquarium pumps.



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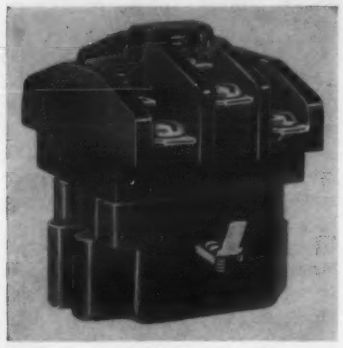


● A 25-ampere, 2 and 3-pole contactor for refrigeration, air conditioning, and heating loads has been announced by Furnas Electric Co., Dept. AH&RN, 1111 McKee St., Batavia, Ill.

The entire contactor is only 2 in. wide by 2⅜ in. long by 2½ in. high, it was pointed out. Small size suits the control for compact panels or cavity mounting, the company said. Coil terminals are combination snap on, solder, and pressure type. Line and load terminals are pressure type.

Features include weld resistant silver-cadmium oxide contacts, encapsulated coil and magnet assembly, unitized construction, and 600-volt spacing. Magnet coil, magnet, and shading coils are encapsulated as a single unit with a moisture and fungus resistant epoxy resin.

Wrench-Screwdriver Gets Fan Hub Screws

● A new combination magnetic hex wrench and Phillips-type screwdriver set for reaching remote set screws in fan hubs has been introduced by Watsco, Inc., Dept. AH&RN, 1020 East 15th St., Hialeah, Fla.

Included are six extra long magnetic hex wrenches each measuring 9 in. in length; three hardened screwdriver tips of standard Phillips type sizes; and a master handle.

The hex wrenches are made of chrome vanadium steel in sizes 3/32, 1/8, 5/32, 3/16, 7/32, and 1/4 in., each magnetized to enable the user to easily recover any set screw that may have fallen in a remote place, the company said.

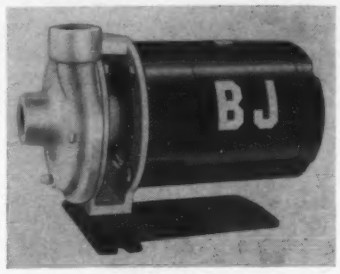
The hardened screwdriver tips are standard Phillips type sizes, No. 1, No. 2, and No. 3, and are designed for snap on to either end of the 1/4-in. hex wrench.

The six magnetic wrenches are operated by a single master handle that incorporates seven hex openings; one for each wrench plus an additional blind opening for the 1/4 in. size that is utilized for operation of the screwdriver tips.

The master handle itself slides to any position along the 9-in. length of the wrenches to enable the user to position his hands as close to the work as desirable, the company explained.

Entire set is packaged in a hinged steel box, total weight only 20 oz. All components are available individually.

Type LX Pump Line Handles Up to 270 Gpm

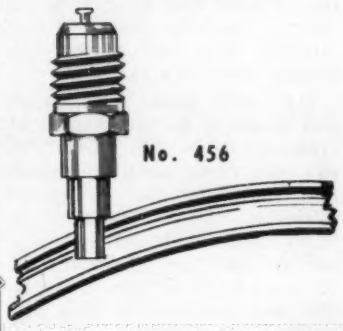


● A new close-coupled general-purpose pump line —the "Type LX Bilton"—has been placed on the market by Byron Jackson Pumps, Inc., subsidiary of Borg-Warner Corp., Dept. AH&RN, P. O. Box 701, Lawrenceburg, Ind.

The line offers capacities up to 270 gpm and heads up to 150 ft. Models are available in motor ratings from ⅓ to 7½ hp, 1 phase or 3 phase, 2 pole or 4 pole speeds. The Type LX is designed for a wide variety of general pumping applications, including air conditioning and refrigeration systems.

The Type LX Bilton employs a new simplified mounting bracket that rigidly supports both pump and motor, eliminating the need for base plates or rigid foundations," it was stated. "The unit can be mounted vertically, horizontally, or at any other desired angle."

Service Valve Taps High or Low Side



● A new series of hermetic service valves that can be used on the high or low side of all refrigeration and air conditioning systems, including automobile air conditioners, has been introduced by the Hi-Lo Valve Co., Dept. AH&RN, P.O. Box 3262, Oklahoma City.

Once the series 456 "Hi-Lo Valve" has been installed, a charging hose may be attached for charging or purging, or gauge readings may be taken, the company said.

Basic 456 valve has provisions for sweating or brazing 1/4, 5/16, and 3/8 in. copper tube to it or being inserted into a copper line, it added.

Variations are available for use in conjunction with driers, with 5/16 and 3/8 in. fittings on opposite sides, brazed to a brass fitting which will accommodate 1/4, 5/16, and 3/8 in. tubing on one side and a capillary tube brazed to the other, and with a 1/4 in. female flare opening by a cap tube opening on the opposite side, according to the manufacturer.

'Cyrstal Tips' Adds Coin-Operated Vendor

● Availability of a coin-operated vending unit has been announced by American Automatic Ice Machine Co., Dept. AH&RN, Fourth St. and Park Ave., Faribault, Minn.

The new model "Crystal Tip" ice vendor has a simple streamlined design with a front lighted roof overhang and a large walk-in door for convenient loading, the company said. Latch and hinge have chromium finish.

Other features of the self-contained vendor include automatic defrosting; a self-closing, vandal-proof service door; and tamper-proof vending mechanism. The company said the vendor is a companion to the line of Crystal Tips automatic ice makers.

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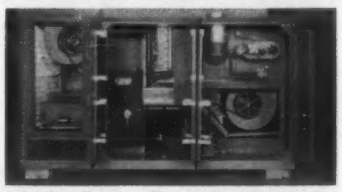
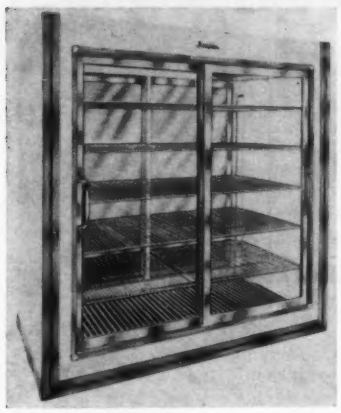


● Roof-top year-round air conditioning units are now available in completely assembled and fully charged packages from Mammoth Furnace Co., Dept. AH&RN, 6425 Cambridge St., Minneapolis 16.

The new combination heating-cooling units are offered in sizes up to 15 tons and 500,000 B.t.u.h. output in a complete factory-wired and charged unit. From 20 to 40 tons, the units are available in two sections which permits field piping to be done by the installing contractor.

Units feature a "uniframe" which allows all components to be encased in a rectangular frame rather than pyramided and supported by base rails only. Hoisting lines are attached to top eyehooks to eliminate damaged and buckled casings.

Pass-Through Refrigerator Speeds Service

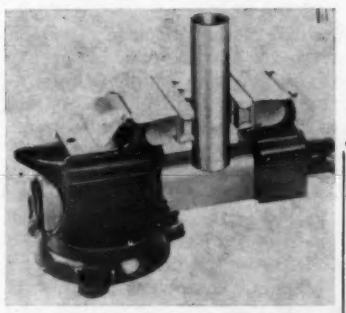


● A "Pass-Thru" refrigerator designed to speed up customer service in supermarkets has been announced by Frigid Igloo Mfg. Corp., Dept. AH&RN, 498 Nepperhan Ave., Yorkers, N. Y.

The company pointed out that bulk packages and fresh cut meats can be prepared in advance and the proper supply stored in the refrigerator, "to be withdrawn conveniently when the peak selling period arrives."

The full vision refrigerator provides flexibility for storing and displaying mass packages of daily specials, it was indicated. Refrigerator takes 30-in. meat pans placed on adjustable wire shelves.

Auxiliary Vise Jaws Grip Irregular Shapes



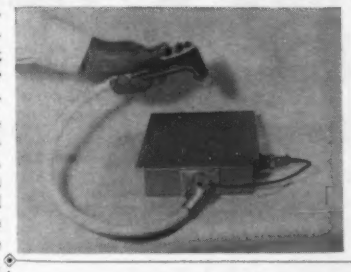
● "Uni-Grip" auxiliary vise jaws, designed to "convert machine vises instantly into universal vises to grip and clamp round, angular, and irregular shapes," are offered by Mid-American Import Co., Inc., Dept. AH&RN, 1919 Champa St., Denver 2.

"The faces of Uni-Grips are a series of case-hardened steel wedges, with freedom of movement like steel fingers, that automatically conform to irregular shapes when the vise is closed," it was explained.

"Uni-Grips will clamp a steel ball, wedge shapes, vertical and horizontal pipe and rods, and irregular shapes. Workmen simply 'Put 'em On and Take 'em Off' of the vise jaws. Free-swinging counter balances hold them in place without screws or clamps."

The company offers Uni-Grips for 4 in., 5 in., and 6-in. vises. Uni-Grips are sold exclusively by the Mid-American Import Co., Inc. direct to the customer, it was stated.

5 Pushbuttons on Remote Drink Dispenser

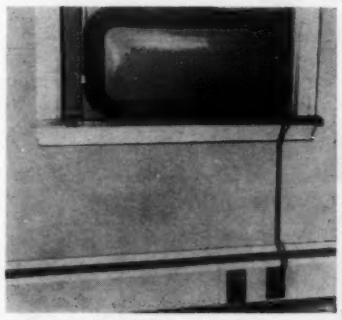


● A pushbutton-type drink dispenser that includes a chrome-plated handle, "5 in one" conduit molded tubing, and all-steel power pack is being offered by Bar-O-Matic Sales Co., Dept. AH&RN, 5962 Kester Ave., Van Nuys, Calif.

Designated Model No. TF-105, the dispenser is used primarily in bars and drive-in restaurants, and is designed for high-speed service of carbonated drinks over the counter, the company pointed out. It serves soda, cola drinks, ginger ale, lemon-lime, and water, or "Tom Collins," quinine water, and "Screw Driver" orange, it was noted.

The company is also marketing an "Electra-Power Tower." This is described as a "counter-model dispenser offering a variety of flavors, carbonated and non-carbonated, which are automatically dispensed when a glass is placed under the spout." It dispenses from one to four flavors at one time.

Tie Baseboard Heater To Air Conditioner



● A simple switch from summer cooling to winter heating is possible by means of a 9-in. matching section available for use with "Chromalox" electric baseboard heaters, according to Edwin L. Wiegand Co., Dept. AH&RN, 7500 Thomas Blvd., Pittsburgh 8.

The section is designed to accept a thermostat to control the baseboard and a 240-volt grounded outlet for a summer air conditioner.

The sections blend in with the companion baseboards to give a streamlined heating, cooling, wiring, and heat control system.

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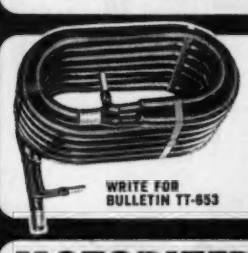

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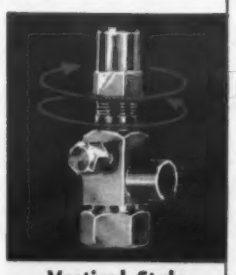

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Conditioning a 'Hard Base'

With Everything Underground Air Conditioning Has Some Added Functions To Insure Operating Reliability

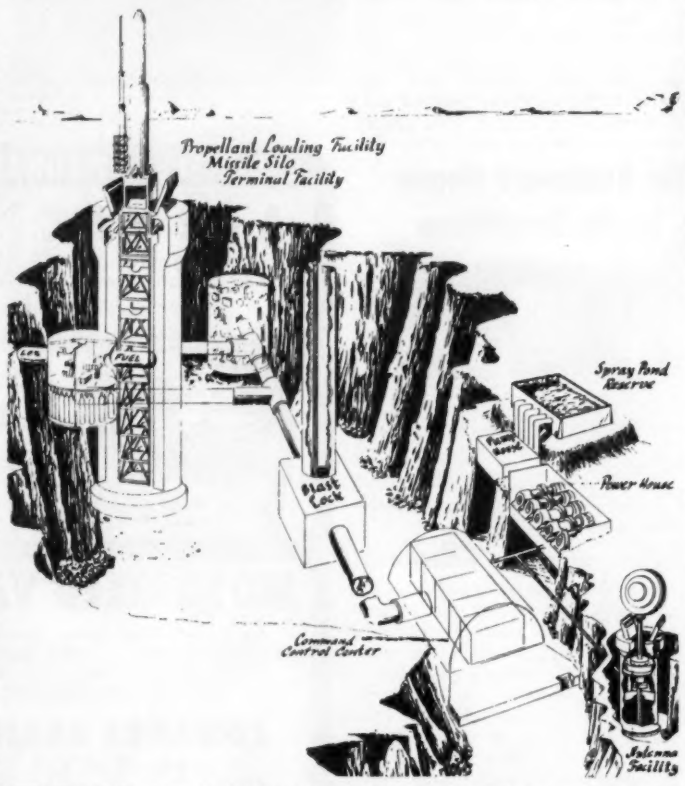
By Phil B. Redeker

VANDENBERG AIR FORCE BASE, Calif.—With the Air Force putting underground most of the facilities for its most potent striking weapon — the Intercontinental Ballistics Missiles (ICBM's) — air conditioning, which has always played an important role in missile launching and support operations, assumes even greater importance.

3 Principal Types of Underground Facilities

For example, in some of the underground complexes to be used for liquid fueled ICBM's, there are three principal facilities: (1) the missile silo from which the missile is launched (2) the propellant loading silo (3) the equipment silo.

In the equipment silo which contains the mechanisms which will prepare the missiles for firing, there are five underground levels—instrumentation, power, checkout, auxiliary machinery — and one entire level devoted to air conditioning equipment. This equipment for firing the missile is designed for completely automatic operation controlled from a remote point, so air conditioning is important in providing clean and properly tempered air in the missile silo, the propellant silo, and all levels of the equipment silo.



THIS DRAWING shows the main elements of the test facility for a Titan missile underground or "hard base" launching facility. In the background is the launching silo, with the missile raised to a launching position through the thick covering doors. At left of the missile silo is the propellant loading facility, and to the right is the five-level equipment silo, one level of which is devoted entirely to air conditioning equipment. In operation all of the above-named facilities are remotely controlled. In the foreground are the command control center, power house, antenna facility, and spray pond reserve. Not shown are the cooling towers for the air conditioning equipment. The spray pond will probably not be used in other "hard base" launching sites.

Purpose of Underground Launching Complexes

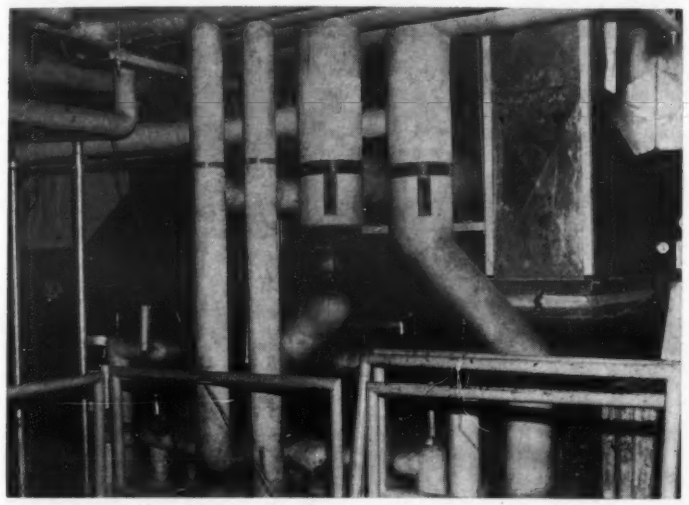
Purpose of the underground launching "complexes" follows the long-standing lesson of the infantrymen that good protection from enemy weapons can be had by "digging in." Should they ever be fired on, they could sustain anything but a direct hit from an enemy ICBM, and still fire back.

In the missileman's lingo these facilities are known as "hard" bases. Such complexes are being built for the Titan, Atlas, and Minutemen missiles. Another new type of launching setup is the horizontal cradle type, in which the missile lies on its side in a protected covering and is raised to the vertical firing position as part of the firing operation.

In the Titan facility at Vandenberg, the launch pad isn't really a pad, but rather a giant circular hole - in - the - ground, known as the missile silo. In this silo, during operational readiness, the 90-ft Titan will nestle. Closed over the silo will be two hinged doors of its hatch, many feet of solid concrete. At a certain point during the firing countdown, the hatch will be opened, the missile elevated clear to the top of the silo, and launched.

15-Story Building Could Be Buried In Silo

The concrete-lined missile silo is so deep a 15-story building could be dropped down in and not stick out the top. Sunk in the ground on each side of it are smaller silos. Closest to the blockhouse, which is called the Command Control Center, is the equipment silo. Thus the "business end" of the complex is a group of three holes, all of which are linked together by an underground tunnel 10 ft in diameter, which also connects the silos with the distant Command Control Center. The tunnel is the "subway" for members of the launching crew.



IN THE CRAMPED underground quarters of the air conditioning level in the equipment silo, large volumes of air for the missile silo and for other vital parts of the launching complex are filtered, washed, cooled, dehumidified, and reheated by this equipment. Chilled and hot water are brought in from equipment located in a remote power house through the large, marked insulated piping shown in the foreground.

Some distance from the blockhouse, in the opposite direction from the missile silo, is the antenna silo, the smallest hole-in-the-ground. Built on to this silo is a relatively small and square-shaped appendage called the antenna silo control room. Off to one side of the blockhouse is the power house, which supplies electricity to the complex.

Because the first underground launching complexes are now in the process of construction, and the Armed Services have not settled on the final design of some of the auxiliary equipment including air conditioning, plus the fact that security regulations prevent disclosures of some details, it is not possible to describe in exact detail the equipment which is going into these installations nor the conditions which the equipment will produce.

However, from personal observations made by the writer, plus discussions with engineers working on the complexes, and a look at some of the specifications for the auxiliary equipment, it is possible to present a reasonably good idea of the type and purpose of the air conditioning to be used in the launching complexes.

Air Conditioning Equipment Described

In the Titan underground missile launching facility, the equipment in the air conditioning level (the fourth level in this construction) the equipment as observed by the writer included:

A large, totally enclosed air handling unit, with chilled and hot water piping. A control sequence instruction panel indicated that the air handling unit would wash the air, cool and dehumidify it, with a reheat function provided to maintain the desired temperature and relative humidity relationship.

In the Vandenberg Titan test facility, the chilled water and hot water is supplied from a power house, which is also entirely underground. For this installation two Trane Centravac compressors are employed, with the engineer in charge reporting that each was rated at 280 tons refrigerating capacity.

The condensing part of the cycle will be accomplished by cooling towers located above ground, one of the few pieces of exposed equipment in the whole complex. In the Vandenberg facility, a spray pond will built to supply extra condensing water in case of emergency, and also for dousing purposes.

The air conditioning equipment described in the preceding paragraphs will be used for the

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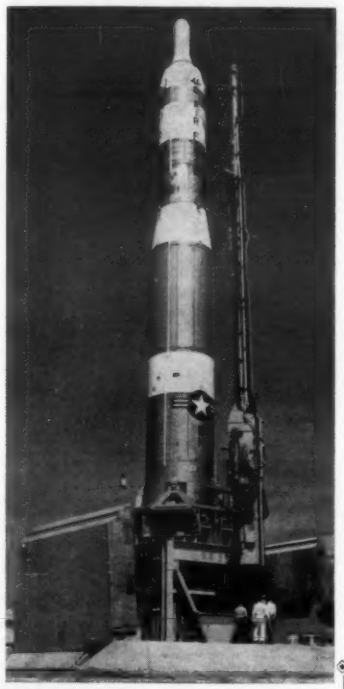


READY for firing after it has emerged through its protective doors from the 140-ft underground silo is the Titan ICBM missile at the Vandenberg Air Force Base operational test facility. Capable of a range of 6,300 miles, the Titan is a two-stage ICBM slated for operational use with the Strategic Air Command at hardened sites throughout the Western U.S.

general cooling of the missile silo, and for the other levels of the equipment silo.

Design Conditions

Available information on the design conditions indicates that the conditions required in these areas will be the maintenance of a 75°F dry-bulb temperature and 50% relative humidity. This condition in itself would not seem to pose any great problems, but when one considers that this condition must be maintained in an underground complex with a variety of heat producing equipment, the job to be done by the air conditioning is not too simple.

The other major equipment in the air conditioning level of the equipment silo is the special air conditioner made by Keco Industries, Inc. for cooling the instrument compartment of the Titan missile prior to its launching.

This unit provides 94,000 Btuh refrigeration cooling; 214,000 Btuh chilled water cooling; 205,000 Btuh hot water heating. Refrigeration capacity is provided by a 7½-hp direct driven R-12 compressor, with crankcase heater, multistep capacity control, and unloaded starting. A shell-and-tube type condenser is used.

The conditioned air supply is automatically controlled both as to air flow and temperature by motorized controllers, and is supplied through separate hot and cold conditioner air outlets, with 165 lbs per minute of air cooled to 37.5°. Part of the cooled air is supplied at the rate of 20 to 40 lbs per minute at 35-40° and at 30-33 in. water static pressure. The remainder is reheated at the rate of 60-145 lbs per minute at 35-130° and 30-33 in. water static pressure.

Thus both hot and cold air are dehumidified to a maximum moisture content of 35 grains/lb dry air.

Evaporator blower is a two-stage centrifugal type direct-driven by a 40-hp, 3,600 rpm motor.

Refrigerant Control

Refrigerant control is by a thermostatic expansion valve. The system also has high and low pressure cutout, low oil pressure cut out, and motorized condenser pressure control.

The control panel contains an hourmeter, refrigerant suction and discharge pressure gauges, oil pressure gauge, cold air and hot air thermometers, relative humidity gauge, air pressure drop across filter indicator, indicating lights, operating switches, and humidistats.

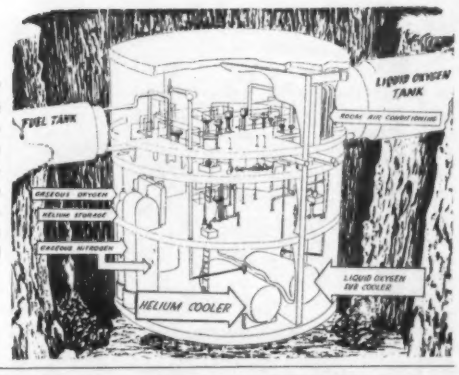
In the operational bases ("hard bases") for the launching of Atlas missiles, which are to be erected at certain Air Force bases around the country, air conditioning will have important functions in two parts of the physical facilities—the launch and service area, and the operations building.

In the Launch and Service Area, the most important role of air conditioning will be in missile pad cooling. In this application, the requirements call for the maintenance of 40° temperature with a 5° variation permitted, and the relative humidity not to exceed 50%.

These conditions are to be maintained for high velocity air delivered by a pressure blower working against a static pressure of 36 in.

The dehumidification phase may be accomplished by cooling or by the absorbent method. There will be pre-cooling of air no matter what system is used.

Other important functions of air conditioning in the launch and service building is for electronic cabinet cooling. A direct expansion system is to provide leaving air at 55° with a 5° permissible variation, and at a relative humidity not to exceed 55%. A reheat cycle is provided in the event that the cooling coils are required to bring the humidity down to the required limit.



PROPELLANT terminal or "silo" from which the liquid-fueled missile engines are fueled prior to launching from the underground base, has some special air conditioning requirements, supplied from the air conditioning level in the equipment silo.

In the Launch Operations Building air conditioning is important in two important segments—the operations area, and in the power plant and mechanical equipment room.

For the operations area, a central air conditioning system will be used to maintain temperatures of 70° in the winter, and 80° in the summer. During the cooling cycle, a maximum relative humidity of 40% will be maintained by a humidistat control, which shall be wired in parallel with the thermostat controlling the cooling coil. The

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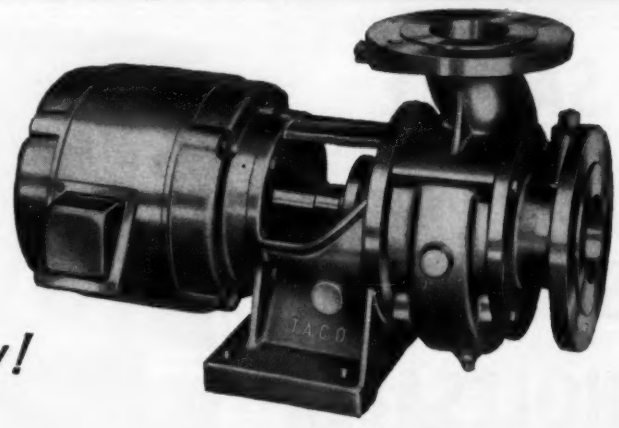

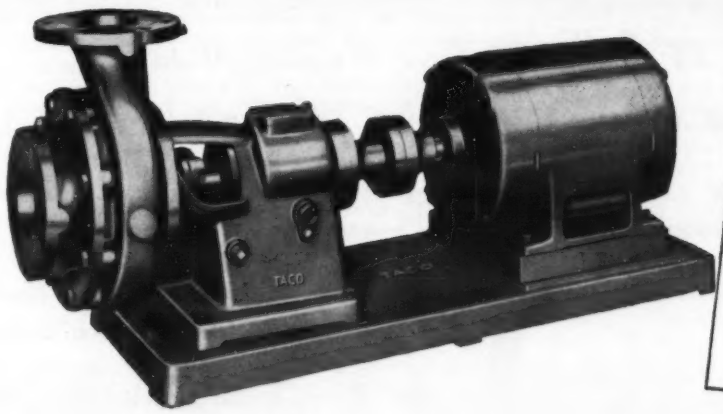

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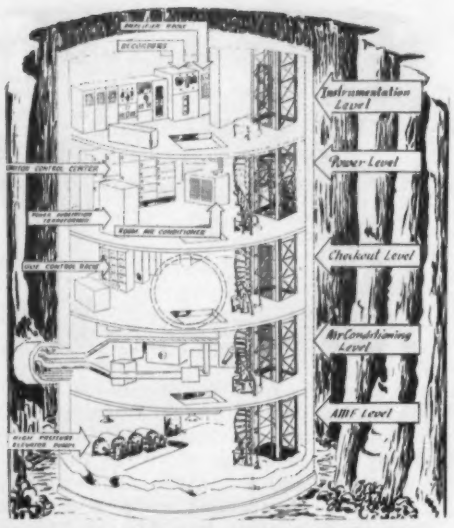
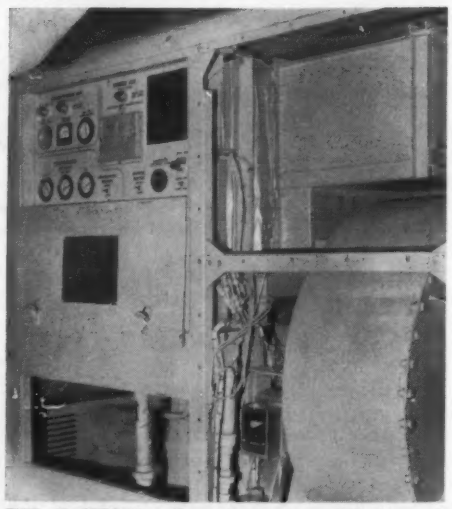


EQUIPMENT silo in the underground launch complex contains the auxiliary equipment vital to the launching process. There are four levels in the equipment silo, the entire fourth level down being devoted to air conditioning equipment which is used to air condition the missile itself, the missile silo, and all of the various underground facilities.



THIS IS SPECIAL self-contained air conditioning unit built by Keco Industries, Inc. to air condition certain compartments in the Titan missile itself before launching. It supplies hot and cold air dehumidified to a maximum moisture content of 35 grains/lb dry air, at 20 to 40 lbs per min. for the cooled air to 60-145 lbs per min. of the reheated air at 30-33 in. water static pressure.

Conditioning a 'Hard Base'--

(Continued from preceding page)
summer reheat controller located downstream of the heating coil will reheat the subcooled air to maintain 80° in the space.

A manual selector switch within the heating-cooling roomstat will control the operation of either the heating or cooling cycle.

Plans call for the use of ceiling type diffusers, and air cleaning with washable type filters. All ventilating fan motors are to be manually controlled and shall run constantly.

There are some special features of the ventilating system peculiar to the application. A ventilating fan exhausts the toilet, and battery room in the operations area and discharges to the atmosphere through a blast gate and exhaust cap. Excess air in the mess area which is not recirculated or exhausted through the kitchen will flow through the vestibule entrance to maintain a positive pressure in the tunnel to the launch and service area.

The power plant and mechanical equipment room application is handled through a ventilating system. Temperatures to be maintained are 70° in the winter, 110° in the summer. Because of radiation from the generators, no heating is required.

The ventilating unit runs continuously, and the motor-operated dampers provide 34,300 cfm using all outside air in the summer, and 17,160 cfm in the winter, taking 4,500 cfm of outside air in the winter. Dampers are interconnected so that as one closes, the other opens.

The specifications for some of the individual components for the operational missile base complexes, as prepared by the Air Force Ballistic Missile Division and reviewed by the office of the chief of U.S. Army Engineers, should be of some interest to those in the industry who are involved with the manufacture and installation of such components.

The selection will include only those which would seem to hold some special interest, and in most instances will be a condensed version of the complete specification:

Specifications for Certain Components

RECEIVERS. Liquid receivers shall be constructed of steel, with welded seams. The inner surfaces shall be thoroughly cleaned by sandblasting or by other suitable means. An approved liquid-level indicator shall be provided in connection with water-cooled equipment. Each liquid receiver shall have a storage capacity not less than 25% in excess of that required for the fully charged system.

COOLING COILS (for R-12 or R-22) shall be constructed entirely of non-ferrous alloys with the fins securely bonded to the tubes. Individual cooling coils shall be dehydrated and sealed at the factory. Each cooling coil shall be provided with an equal number of liquid and suction connections.

VIBRATION - ABSORBING FOUNDATIONS. All items of mechanical equipment including compressors, fans, and pumps, shall be properly isolated from the building structure by means of approved vibration-absorbing foundations. Each foundation shall include an adequate number of standard isolation units. Each unit shall consist of machine and floor or foundation fastenings together with intermediate isolation material.

REFRIGERANT STRAINERS shall be installed in the refrigerant line on the inlet side of each thermostatic expansion valve and each solenoid valve. Strainers installed in conjunction with expansion valves may be an integral part of the expansion valve. Independent strainers shall be provided with brass or cast iron bodies designed for a working pressure of 250 psi with strainer baskets constructed of non-corrodible sheet metal with small performations of sufficient number to provide a net free area through the basket at least 10 times that of the liquid-refrigerant line. The basket shall be removable for cleaning without breaking the inlet and outlet connections.

SCALE TRAP shall be installed

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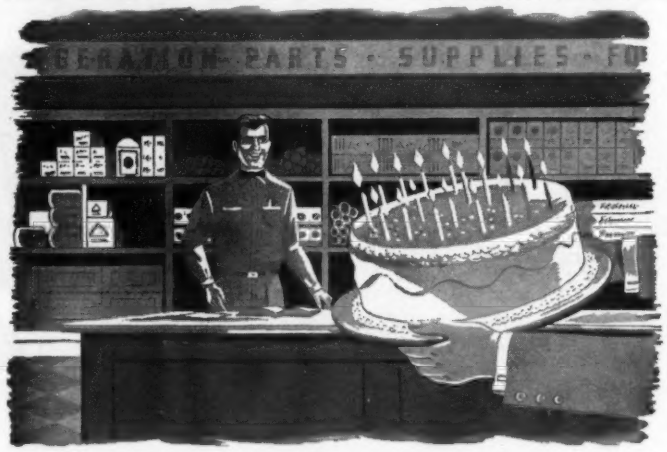

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in the suction connection to each compressor unless the compressors have built-in scale traps. The scale trap bodies shall be constructed of cast iron, and the screens shall be made of sheet brass or other suitable material. Independent scale traps shall be designed to permit cleaning without breaking the inlet or outlet refrigerant connections.

SIGHT GLASSES. Refrigerant sight glasses shall be installed in the liquid refrigerant line and shall be of the double port type. Sight glass shall be of the same size as the refrigerant line.

WATER REGULATING VALVE for water-cooled condenser shall be the spring diaphragm modulating type to open on pressure increase, applicable to the refrigerant. The valve shall have a copper or brass capillary tubing, with a standard pressure connection, brass body, and brass bellows in the brass cup of the power elements.

SAFETY CUTOFF AND ALARM SWITCHES. An automatic safety cutoff switch shall be provided for each condensing unit, and shall operate to stop the compressor and simultaneously sound an alarm and turn on a red light whenever the condenser pressure is too high or too low or the compressor oil pressure is too low. All audible alarms and red lights shall be located in the Launch Operations Building. The alarm shall be provided with a disconnect switch. The red light shall be wired so that it will be on whenever the refrigeration compressor is shut down.

THERMOMETERS of the separable-socket type, with not less than 5-in. scales and stems of appropriate length or dial thermometers with a 3½-in. minimum diameter dial for indicating representative temperature, shall be installed in the ducts where indicated on the drawings and where required for proper supervision of the system.

LUBRICATING OIL. The contractor shall furnish two complete charges of lubricating oil for each compressor crankcase. The oil shall be of a type recommended by the manufacturer of the equipment. One charge shall be used during the testing period, and upon the satisfactory completion of the tests, the oil shall be drained and replaced with the second charge.

FLOOR, WALL, AND CEILING PLATES. Uncovered, exposed pipe where passed through floors, finished walls, or finished ceilings, shall be fitted with chromium plated or enameled cast iron steel plates. Plates shall be large enough to completely close the hole around the pipes and shall be square, octagonal, or round with least dimensions not less than 1½-in. longer than the diameter of the pipe.

Propeller Type or Vane-Axial Fans

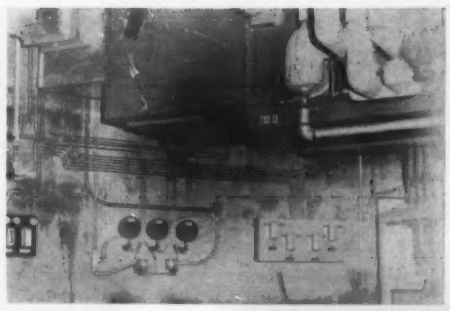
PROPELLER TYPE OR VANE-AXIAL FANS will be enclosed in cylindrical metal frames or supported on heavy metal frames designed for wall or ceiling mounting. Motors and fans shall be mounted on resilient supports. Thermal-overload protection shall be provided in the starter or integral with the motor. Vaneaxial purge fans in the Missile Storage Area and in the Fuel Transfer Area shall be started and stopped automatically by gas detection units.

FILTERS (for the Launch and Service Area). Standard type filters of the permanent, washable type will be approximately 2 in. thick, and shall have when clean a resistance not in excess of ⅛ in. of water when handling 3 cfm of air per sq. in. of face area. The dust-collecting efficiency shall be not less than 52% when tested by the photo-light-meter-discoloration test developed by the National Bureau of Standards using Cottrell precipitate. The dirt-holding capacity of each filter section, when the static-pressure drop through the filter becomes 0.25 in. of water, shall be not less than 1.0 gram per sq. in. of face area. Each filter section shall be composed of an all-metallic filter medium enclosed in a suitable metal frame.

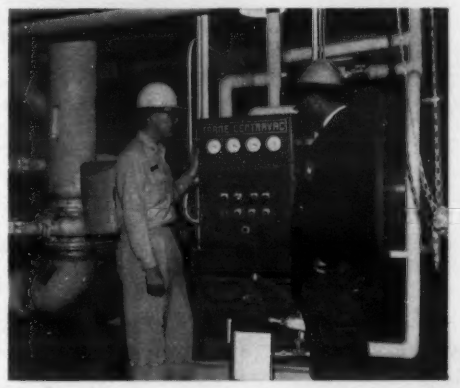
FIVE MICRON TYPE FILTERS shall be dry replaceable media or replaceable cartridge type. Filters shall have better than 97% efficiency for particles of 5 microns and larger. Air filters shall consist of permanent heavily cadmium plated 20 gauge steel frames constructed of a metal box section and a removable section with wire, support for the media and thick felt gaskets to provide an air tight seal between the frame and the filter cartridge and factory assembled replaceable filter cartridges.

The filter cartridge shall consist of a fire-resistant heavy composition board frame containing an all-glass filtering medium. . . . The filter medium shall be arranged in a deep-pleated form to provide at least 86 sq. ft. of filtering area for each 1800 cfm of rated capacity and shall be secured to the cartridge frame with a fire-resistant adhesive. The filtering medium shall be adequately supported all-glass fiber mat of over ¼ in. thickness consisting of such fine selected fiber sizes that the average filtering efficiency on atmospheric dust over the life of the filter shall be 80 to 85%. The maximum pressure drop across the clean filter shall be between 0.30 and 0.35 in. of water when operating at rated capacity. The assembly, including filters, manometer, frames cutwork housing shall be a complete factory fabricated air tight unit and shall be designed to withstand a pressure of 38 in. of water, without leakage.

BACK DRAFT DAMPERS AND AUTOMATIC SHUTTERS consist of a set of delicately balanced louvers that open automatically when the fan starts and shut by gravity when the fan stops. The louvers shall be constructed of galvanized iron or steel weighing not less than 0.90625 lbs per sq. ft., or of sheet aluminum of adequate thickness. The edge of the blades shall be provided with felt strips to prevent rattling.



CONTROLS for the general air conditioning system in the air conditioning level of the equipment silo are complex, and have been installed with the greatest of care, to insure reliable operation during the remotely controlled launching process. Controls are grouped by function and are individually mounted on the walls of the equipment silo.



REFRIGERATING effect for the air conditioning systems (other than self-contained units) serving all the underground complex is supplied by chilled water produced by two centrifugal compressors totaling more than 500 tons' capacity. Checking over the starting control for the compressors, located in the underground power house, are Capt. Clifton Wright (left) of the department of civil engineering, 1st Missile Division, and George Cundiff, civilian mechanical engineer attached to the 1st Missile Division.

High Pressure Ductwork

HIGH PRESSURE DUCTWORK. The duct system from the pressure blower to the missile pad stub-up and thrust section heating stub-up shall be constructed of not less than 16 U.S. standard gauge aluminum and shall be designed to withstand a pressure of 38 in. of water without leakage. Ducts shall be suitably reinforced to prevent buckling and vibration, and shall be non-collapsible type. Elbows and angles should have an inside throat radius of two pipe diameters wherever possible, and not less than one pipe diameter.

REGISTERS AND GRILLES. Exhaust registers and grilles shall have a free area of not less than 60% of the area of the duct opening and shall be constructed of stamped iron or steel sheets not less than 12 gauge. Exhaust registers shall be provided with suitable volume dampers adjustable from the face. Suitable adjustable volume dampers shall be provided behind the face of each register. Key operation shall be provided for all register dampers.

INSULATION. Air handling units, centrifugal supply air fans, pressure blowers, fresh air plenum, supply air, return air, and fresh air intake ductwork shall be insulated. No insulation is required on exhaust ductwork. Insulation shall be not less than 1-in. thickness of impregnated mineral wool, thermally equivalent thickness of glass insulation, or other equally suitable material.

Insulation on main ductwork and all exposed ductwork up to 8 ft above the floor which may be subject to damage shall be protected by means of a finish coating of suitable plaster not less than ¼ in. in thickness, applied in a manner recommended by the manufacturer of the insulation. The insulation shall be mechanically secured to the ducts by means of galvanized steel wire and corner

(Continued on next page)

FOR ALL TYPES OF REFRIGERATION AND AIR-CONDITIONING SYSTEMS

The inside story as you can see above is built-in quality and sturdy construction. Outstanding for high vacuum service, liquified petroleum gases, gasoline, instrument control panels, oxygen (degreased), compressed air, water, nitrogen and refrigeration boards. Full flow, forged brass body, beryllium copper and stainless steel diaphragms are a few of many features. Available in sizes ¼" through ⅜" flare and solder sizes. See your Kerotest wholesaler.

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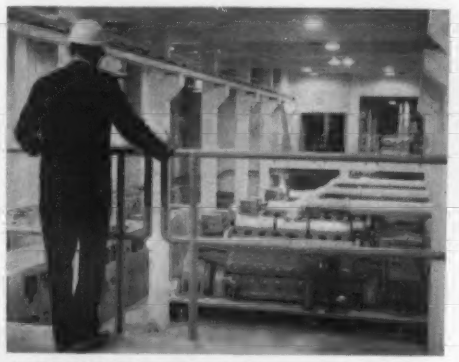

UNDERGROUND powerhouse for the Titan "hard base" test launch site has diesel-driven generators that could supply electricity for a fair-sized city. Centrifugal compressors which cool the chilled water supply for the air conditioning system are also located in the powerhouse, but are not shown in this picture.

UNDERGROUND access tunnels stretching hundreds of yards long between various parts of the launch complex also carry some of the piping for the air conditioning system, as well as connections for other utilities.

'Hard Base'--

(Continued from preceding page)
angles, cemented surface anchors, or other approved devices or ways.

FLEXIBLE CONNECTIONS for preventing the transmissions of vibration through the ducts to the various rooms, shall be installed between suction and discharge openings in fan housings and the ducts with which they are connected. Unless otherwise required, the material used shall be canvas weighing not less than 15 oz per square yard, or an equally acceptable glass, asbestos, or other approved fabric. Canvas shall not be employed except in locations where the flexible connection is in the same room as the fan.

Flexible Connections For Pressure Blower

FLEXIBLE CONNECTIONS for the PRESSURE BLOWER shall be installed between the suction and discharge openings of the pressure blower and the ducts with which they are connected. These shall consist of neoprene or circular rubber duct with spiral wire reinforcing molded internally. These connections shall be secured around collars of 18-gauge shop fabricated galvanized sheet metal flanges on both ends by means of adjustable (circular) draw bends, and made positively air tight by use of adhesive between adjoining materials. Rubber gaskets ⅛-in. thick shall be provided between the flanges of the pressure blower and the flanges of the flexible connection. All connections must be air tight and able to withstand a pressure of 38 in. of water without leakage.

ELECTRICAL WORK. Firestats set at 50° above duct air temperature shall be furnished and installed in the ducts by the contractor for automatically stopping fans in the event of fire.

BOILER shall be designed for a water-working pressure of 40 psig minimum, and shall be constructed and equipped in accordance with the ASME BOILER and Pressure Vessel Code. The boiler shall be provided with the necessary connections, and shall be equipped with a combined pressure gauge and thermometer, a water temperature regulator and a water-relief valve. The boiler shall have standard name plates containing the manufacturer's name and address and the trade name and catalog number of the boiler, securely affixed in a conspicuous place.

Oil Burner

OIL BURNER shall be of the mechanical-atomization type or air atomization type suitable for handling No. 2 commercial fuel oil, or No. 2D diesel fuel. The burner shall be quiet in operation and shall operate with a balanced flame so as not to localize heat in any part of the combustion chamber. The burner shall be capable of complete atomizing and effectively mixing the oil with air so as to insure complete combustion, but not of such quantity as to produce an undue percentage of excess air with attendant high stack loss. The oil burner shall operate without clogging or failure, and shall have sufficient capacity to develop the specified boiler capacity. Each burner shall have synchronized control of the quantity of oil, primary air, and secondary air to be supplied.

Burner Safety, Operating Controls

BURNER SAFETY AND OPERATING CONTROLS. A time delay switch shall be installed in connection with the I.D. fan to provide for pre-purge. An electronic type combustion safeguard shall be installed. This shall consist of a flame sensing element and a sequence timing control which shall provide for pre-purge, proving, and monitoring of main flame and post purge. The controls shall shutdown burner equipment within 4 seconds after a flame failure. The controls shall create a safety shutdown within 4 seconds after de-energization of ignition equipment if main burner flame is not properly established or fails during the normal starting sequence. A safety shutdown shall require manual reset before operation can be resumed and shall prevent recycling of the burner equipment.

The automatic programming controls shall provide for the following upon initial start and all subsequent restarts during "on and off" cycling: (a) Low fire start, (b) Pre-combustion scavenging of sufficient duration to provide four air charges of the volume of the combustion chamber. During pre- or post-combustion scavenging periods only the induced draft fan shall be on, ignition and main fuel valve shall be off. (c) Trial-for-main-burner ignition period from 5 seconds minimum to 30 seconds maximum. (d) Proper shift of operation from programming control to combustion operating controls.

Timing periods to sequence burner cycling shall not be affected by variations of ambient temperatures between 32°, or by variations within plus 10 or minus 15% of nominal voltage. When supply voltage failure occurs the programming control shall automatically recycle when power is restored. The electronic device shall readily detect flame under all firing conditions of both pilot and main flame, but shall not be actuated by hot refractory or any other hot body. The burner shall also be interlocked with the blast valve in the exhaust duct so that whenever the blast valve is closed the burner cannot operate.

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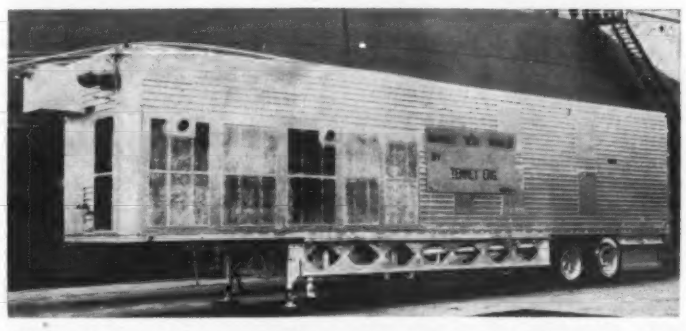


30-TON, 46-ft semi-trailer van provides extreme environmental conditions for testing missile parts when and where needed, even on a launching pad.

Mobile Climate Simulator Eliminates Part of Guesswork In Missile Launching

UNION, N. J. — A unique climate simulator that withstands practically any ground weather while generating extreme environments of its own has been delivered to White Sands Proving Grounds by Tenney Engineering, Inc., here, for testing missile parts on the launch pad.

Housed in a 30-ton, 46-ft. semi-trailer, the climate simulator can be moved to any point that wheels can travel. It can ignore outside temperature as cold as an Arctic -5°F or a tropical 115° or rainfall as much as 2 in. an hour, or a desert sand and dust storm of 75 mph, or solar radiation of 400 Btu per sq. ft. an hour while engineers create and hold the following conditions:

Temperatures of -85° to 200°, relative humidity of 20 to 100%, and air flow of 600 to 6,000 cfm.

Robert H. Brown, Tenney's vice president for sales, said the mobile giant, self-contained with its own 400-kv diesel electric generator, cost approximately $150,000.

"The value of this unit to the missile and space program," Brown said, "is that it can be moved from site to site for use when and where needed.

"If engineers have any doubt as to how a rocket part will function, they can promptly test it under a wide range of conditions encountered in flight, a far surer, faster, and more economical way of achieving a successful launching than guessing."

•

Tenney Acquires Electronics Firm

UNION, N. J.—Tenney Engineering, Inc., manufacturer of environmental test equipment and of refrigeration and air conditioning components, has contracted to acquire Communication Measurements Laboratory, Inc., of Plainfield, N. J.

CML makes electronic generators and instruments for space systems and for scientific and industrial quality testing.

Saul S. Schiffman, chairman of the board of Tenney, described the move as "an important expansion of our activities in the electronics field." It is expected to add a million dollars a year to Tenney's sales volume.

The acquisition mainly involves the exchange of Tenney stock, which is traded on the American Stock Exchange. CML has been privately owned.

CML will be operated as a wholly-owned subsidiary and will continue with the same personnel, although its staff will be enlarged and its scope of operations broadened.

Add this Plus Feature for Air Conditioning... Ventilating... Heating!

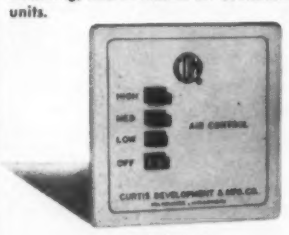
CURTIS SPEED CONTROLS *Provide* **Sure Reliability and Overall Efficiency**

Curtis SPEED CONTROLS are *ideal additions for manufacturers of air conditioning units, kitchen exhaust fans, ventilating units, blowers, unit heaters, etc. . . . wherever shaded pole motors or permanent split capacitor motors are required.*

A step-type, 3-speed (high, medium, low) & off position control unit, consisting of a reactor and a rotary or push button control switch . . . Curtis installation-proven SPEED CONTROLS offer *a new way to improve your product . . .* assuring complete customer satisfaction.

Curtis Speed Controls feature quiet operation . . . reliable UL-approved switch . . . simple, easy installation . . . reduced assembly time in factory or field . . . with outstanding performance and definite economies.

You can select from standard types and enclosures or special types and enclosures will be designed for your particular needs. Curtis Speed Controls are available for flush mounting, in completely enclosed box, for special plate mounting, and in deluxe air conditioning units.



Model UTB

Curtis Flush Mount Air Speed Control . . . with reactor and push button motor speed control switch mounted on a double gang plate for flush mounting on wall in plaster type outlet box.

Write TODAY for Bulletin DS-137 giving complete information and specification sheets.

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Milwaukee 16, Wis.

AGA on Test Pressure Change--

(Continued from Page 1, Col. 2)

and we will see that they are placed before the committee which is the appropriate body.

"We do not, of course, presume to speculate on what action may be taken by the committee," Hodgdon added. "However, if the recommendations made by Mr. Asher (George Asher, executive secretary of BHCB) find support nationally, I am sure the committee will take steps to revise the standards concerned."

As reported in the Sept. 12 issue of the NEWS, Asher told AGA that, in some cases, warm air distribution systems are being designed in excess of the available external static pressure on furnaces of less than 100,000 Btuh input.

He indicated that the lower static pressures do not apply satisfactory to homes as they are being constructed today.

Installation of heating equipment connected to undersized distribution systems is detrimental to the warm air industry, he asserted. So is the alternative, use of larger size ducts in small houses, he added.

Letter States AGA Position

Hodgdon, in a letter to the NEWS, made clear AGA's position in the matter.

He wrote:

"The standards under which the Laboratories test appliances are not developed by the Laboratories nor are they under its control.

"These standards are under the jurisdiction of ASA Sectional Committee Z21, and responsibility for the technical development of standards for furnaces comes under its Subcommittee on Approval Requirements for Gas-Fired Warm Air Furnaces.

"This is the group that will be asked to consider Mr. Asher's letter.

"It may be worth while to point out that under the present standards, warm air furnaces may be approved for operation at a normal temperature rise of from 50 to 70°F, to cover units normally employed in conjunction with cooling systems; for operation at a normal temperature rise of from 70 to 105°, or for operation at a normal temperature rise of from 100 to 130°.

Flexibility Illustrated

"Approval is obtainable for operation against an external static pressure of 0.12 in. water column for units having input ratings below 80,000 Btuh, up to an external static pressure of 0.30 in. water column for units having input ratings above 375,000 Btuh.

"At the option of the manufacturer, approval may be obtained for operation at external static pressures in excess of the minimum limits specified, in which case marking must be incorporated on the unit showing the static pressures at which the unit has been tested.

"The above is presented to illustrate to what extent the subcommittee has gone in development of requirements to suit units intended for various installation conditions.

"While the preponderance of contemporary construction is probably the 'ranch' type home, which normally calls for operation of a furnace against an increased static pressure over that in a conventional two-story dwelling, there apparently is still a demand for units in the range of input ratings up to 100,000 Btuh designed for operation against a static pressure of from 0.12 to 0.15 in. water column.

"Additionally, since units in this input rating range are available for operation against higher static pressures, and in such cases the static pressure for which tested are marked on the unit, it would appear that the problem is the selection by the builder of the correct furnace for the installation."

Chicagoans Push Plan for Separate Bids-

(Continued from Page 1, Col. 1)

recommended separate specifications which are essential to the taking of separate bids.

"At the present time," he commented, "a consulting engineer is somewhat in the dark in this respect.

"The publication under development will be authoritative in that it will be endorsed simultaneously by all four contractor groups. A similar listing, issued independently by any one group, would be subject to dispute by the three other contractor classifications and hence would be of doubtful value."

The first brochure, issued last July and also mailed to chapters of the four national associations represented by the local groups and to their national headquarters, is entitled "The Chicago Plan for Separate Mechanical Specialty Contracting Bids."

Plan Summarized

In summary the plan says:

"It is the firm conviction of the Coordinating Committee of the Mechanical Specialty Contractors Association of Chicago that construction costs can be appreciably reduced, and bid shopping, bid peddling, and broker contractors can be eliminated by means of the following recommended procedure:

"A. Prepare separate specifications for each of the four categories of mechanical specialty work, namely:

"1. Plumbing and sewerage.

"2. Heating, piping, refrigeration, and automatic temperature control systems.

"3. Ventilating and distribution systems for conditioned air.

"4. Electrical installations.

"B. Take separate bids from reputable contractors on each of the four above classifications of work.

"C. Let separate contracts to the four low bidders, if qualified.

"D. Provide for optional assignment of mechanical specialty contracts.

"E. Stipulate direct payments to the mechanical specialty contractors, in the event contracts are assigned."

Single Contract System Seen as Cause of Bid Shopping

The committee pointed out that bid shopping "has been condemned and disavowed by every code of ethical conduct of every contractors' group in the industry, including general contractors. . . . Still it continues to flourish and it will continue just as long as the single contract system of bidding persists."

Declaring the single contract system of bidding obsolete, the committee pointed out that mechanical specialty work now comprises from 40 to 70% of the total cost of the building.

It argued that where applied, separate bids have proven to be completely effectual in eliminating the practices complained of.

"Under this system," the brochure explained, "each of the mechanical specialty contractor groups submit separate bids directly to the owner or to his representative, the architect or consulting engineer, on the basis of separate specifications covering their particular category of mechanical specialty work.

"At no time prior to the opening date, does any bidder get to see his competitor's bid. At no time after the opening can he offer to reduce his original bid.

"By the same token, he is not at any time requested to meet the lower bid, real or imaginary, of a competitor. In addition, and equally important, no intermediate contractors adds to his bid an unspecified 'carrying charge.'

"On the basis of extensive experience with this system, it can be stated unequivocally that it produces two highly satisfactory results:

"1. Costs have been lowered. On innumerable projects, under which bids were taken both ways, i.e., separately and combined, the cost of separate bids has been lower in virtually every instance.

"2. Bid shopping and bid peddling have been eliminated. The low bidder, if qualified, is awarded a separate contract at the price shown in his bid.

"As a consequence, he is not obligated to cheapen the job in order to make a legitimate profit. The owner gets what he pays for—and at a lower price."

End-of-Season Air Conditioner Sales--

(Continued from Page 1, Col. 2)

from the 125,000 reported sold in July 1959. For the calendar year to date, manufacturers' sales are estimated at 1,230,500 units, compared to 1,056,000 units in the comparable period last year.

A debate continues over the number of room units in manufacturer and distributor inventory. Certainly it is, and will continue to be higher than last year, when inventories were being put in the hands of dealers to beat the excise tax deadline. Some estimates put the figure at around 500,000 units. At a similar time two years ago, the inventory at this time was placed at about 415,000 units.

Central residential air conditioning system sales seemed to have fared better, particularly at the retail level. Manufacturers' sales for the first six months were estimated at 140,000 units compared with 112,000 in the first half of 1959. July comparisons are not in at the time of this writing.

In retail sales of central residential units, Florida Power Corp. reported sales of 252 heat pumps in July of this year, compared with 110 in July, 1959, and sales of 523 conventional central residential systems, as contrasted with 363 in July, 1959. Central commercial heat pump systems in July dropped to 26 heat pump type from 48 last year, and 46 conventional commercial systems from 81 last July.

In the Chattanooga, Tenn. area in July, room air conditioner sales were down around 15%, and unit sales of central residential and commercial systems were off 42%. Other parts of the south, southwest, and far west were reporting generally good central system sales.

In most metropolitan centers, there has been no wholesale dumping of air conditioners at distress prices, primarily because past experience has indicated that this does not bring about any great sales activity at the end of the season. In some areas distributors were reported offering special prices to dealers with deferred payment plans with down payments as low as $5 per unit, to get the merchandise out of their warehouse.

NEWS readers are invited to write to the editor giving their opinions on any subject of interest to the industry.

A Great New, Labor Calculator Book Saves Money Figuring Time Costs

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Designed and fully tested by mechanical contractors and mechanical engineers, this 70-page, hand-book size labor Calculator book can be an important assist in figuring time cost of your next job! Now, you can quickly estimate labor-time cost of your job with the new "Mech-O-Lator." Each left-hand page blank for your area hourly wage cost, etc. Proven on Pacific Coast, now available nationally! Save time! Highly regarded as a wonderful assist in figuring a job time-cost. You can really save many times the small cost of this comprehensive book!

"MECH-O-LATOR" comes in 7 indexed sections dealing with such jobs as Air Conditioning, Heating Equipment, Plumbing, Fittings, Valves, Pipe, Pumps, Misc. (Insulation, Water Meters, Tanks, Etc.)

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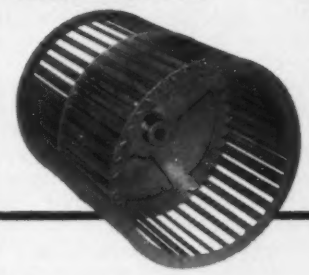

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Carrier Builds New-Type Cooling Machine for Use In Missile-Firing Subs

SYRACUSE, N. Y.—A new type of cooling machine for use in air conditioning the missile-firing attack submarine *Pollack* was shipped by Carrier Air Conditioning Co. here Sept. 16 to N.Y. Shipbuilding Corp., Camden, N. J.

The new machine is one of 21 Carrier is building for nuclear submarines, according to Russell Gray, president of the Carrier division.

Previous models have already been shipped for the attack submarine *Thresher,* and the Polaris-firing *Ethan Allen.* The attack class vessel such as *Pollack* has been described by the Navy as "the most effective anti-sub weapon ever conceived."

The new machine for *Pollack's* air conditioning system is an adaptation of the steam-activated absorption refrigerating machines Carrier developed for big building air conditioning in the mid-1940's. It uses steam from the nuclear reactor, eliminating the need for extra electric generating equipment.

"It is also far quieter than piston-type cooling machines, due to its lack of moving parts," Gray said. Improvements in anti-submarine weapons, such as sonar and sound-seeking missiles have made this type of unit essential for the newer submarines, he declared.

The new cooler will produce capacities ranging from 100 to 200 tons, depending on fluctuating operating conditions. It will handle the heat generated by *Pollack's* 88-man crew, operating machinery, and cooking and laundry facilities. It is capable of withstanding high shock resulting from depth charges or recoil after missile-firing.

Lt. Cmdr. John H. Ebersole, who was aboard both the *Nautilus* and the *Seawolf* when they set undersea endurance marks, said neither record could have been achieved without air conditioning.

Interviewed during a visit to the Carrier Corp. plant here, he quoted from the *Seawolf* commander's report on her 60 days under the surface: "Control of the air for two months without exposure to the outside proved no problem."

In atomic submarines during normal underwater operation, Dr. Ebersole said, large amounts of heat and humidity are given off by the reactor, electronic equipment, crewmen, cooking, and steam leakage.

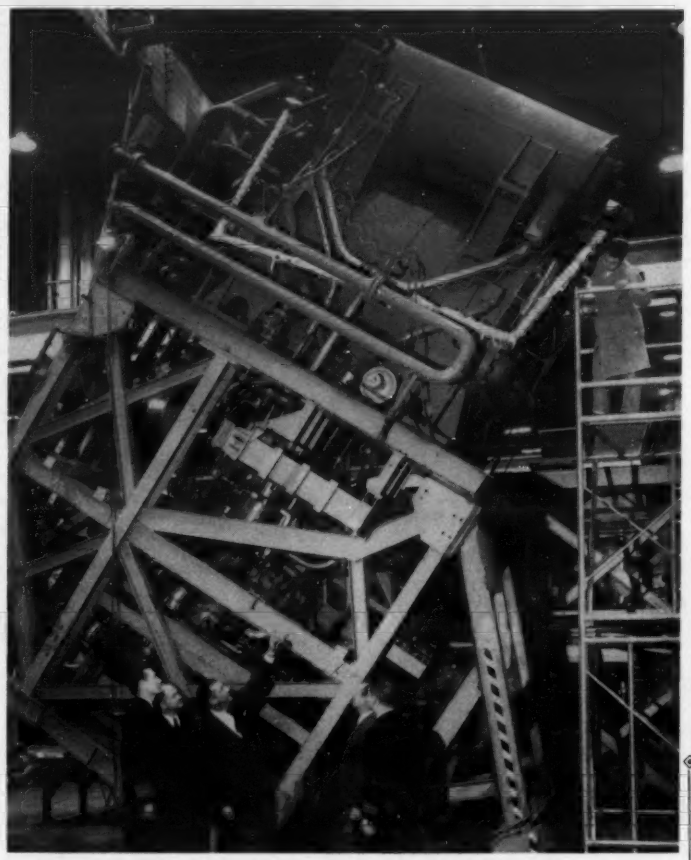
"Without air conditioning," he said, "it would be impossible for humans to endure long submerged cruises."

Special problems are created by Arctic waters. Without positive control of interior conditions, the chilled metal structure of the submarine would cause moisture to condense on internal surfaces and create a cool damp environment.

"In warm equatorial waters," he continued, "there is little transfer of heat through the hull to the water. During one cruise when the air conditioning was temporarily shut down, the temperature in the engine room rose to 130° in 20 minutes."

But with air conditioning, the interiors of the *Nautilus* and *Seawolf,* whether under the polar ice cap or in warm waters, were at 73° and 52% relative humidity, he said.

Dr. Ebersole is a consultant to the committee on life sciences of the National Aeronautics and Space Administration, Project Mercury, which hopes to put a man in space. He noted that all nuclear subs are equipped with air conditioning.



SIMULATED SEAWORTHY TRIAL of new steam-operated cooling machine for the attack submarine Pollack is witnessed by Navy officials at Carrier Air Conditioning Co., Syracuse, N. Y., prior to shipment to N. Y. Shipbuilding Corp., Camden, N. J. While pitched 30° the unit must continue to provide chilled water for the air conditioning system. The cooling unit has few moving parts to create noise or vibration, an essential in avoiding underwater detection. Charles V. Fenn, Carrier executive vice president, points out a feature to (l to r) Capt. James E. Halligan, assistant director, technical logistics, Bureau of Ships; Comdr. Charles A. Allsopp, director, pump, air conditioning and refrigeration branch, Bureau of Ships; William H. Macdonald, Carrier manufacturing manager, and Lt. Comdr. J. T. Boehret, acting inspector of naval material, Syracuse.

Special Dehumidifiers Hold Humidity At 40% at Polaris Assembly Depot

CHARLESTON, S. C. — Protecting Polaris missiles stored in scores of concrete magazines at the new Polaris Assembly Depot here from the ravages of moisture that would render them inert are special dehumidifiers that hold humidity inside the magazines at 40%.

Within each magazine lie four Navy Polaris missiles for use on submarines. Protecting each magazine is a dehumidifier designed and produced by Dryomatic Corp. of Alexandria, Va., and installed by Cleveland Consolidated of Jacksonville, Fla.

The dehumidifier prevents destructive water vapor from jamming the thousands of minute working parts in the missile and affecting its accuracy.

Before the dehumidifiers were installed, the doors of each concrete magazine were completely sealed with gaskets to prevent unprocessed air from entering. A dehumidifier was installed outside each door with an alarm light and with temperature and humidity recording devices.

Each dehumidifier has two towers and two blowers. One blower draws air through silica gel, a substance which adsorbs water vapor. After this air is relieved of most of its moisture it returns to the magazine.

While one tower does this, the companion tower is regenerating its moisture-laden silica gel. This occurs by drawing air from the outside and heating it to a temperature which allows the escape of moisture adsorbed by the silica gel.

Thus the drying agent is effective, cycle after cycle.

If a malfunction develops, or if the humidity within a magazine rises, the alarm light flashes. On-the-spot maintenance personnel make necessary adjustments.

Omitted from Issue

PATENTS and the second instalment of "HOW TO SELL HEATING SUCCESSFULLY" have been left out of this issue to allow publication of more information on AIR CONDITIONING FOR MISSILES.

Make Extra Winter Profits!

Jiffy Air Conditioner Covers

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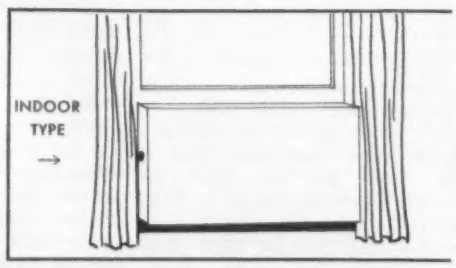

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REPRESENTATIVE WANTED in your territory. From your desk you can earn a substantial addition to your income. Only written contacts with your clients! Write for particulars and further details to VKK-OFFICE, Vienna 66, P.O.B. 129, Austria.

MANUFACTURERS' AGENCIES wanted. We are looking for manufacturers' agencies in air conditioning, heating and refrigeration in New Jersey and New York area. We are qualified consultants along these lines. Replies confidential. BOX A6599, Air Conditioning, Heating & Refrigeration News.

MANUFACTURERS' AGENTS — To handle a complete line of commercial refrigeration, air conditioning and heating coils of a nationally known manufacturer in business over 50 years to be sold to OEM accounts and wholesalers. Excellent commissions. Territories available are: 1. Kansas, Oklahoma, Missouri, Iowa and Nebraska; 2. Tennessee, Louisiana, Mississippi, Alabama and Georgia; 3. Colorado, New Mexico, Arizona and Utah. Send resume' and lines now carried to: BOX A6615, Air Conditioning, Heating & Refrigeration News.

WANT GOOD service manager in Los Angeles area who is ready to run his own service operation. Will turn over service end of air conditioning sales and contracting business on lease, sale, or other reasonable basis. BOX A6621, Air Conditioning, Heating & Refrigeration News.

MANUFACTURERS' REPRESENTATIVE for complete line commercial and industrial low temperature cooling equipment; heating, ventilating and air conditioning products. Well established nationally known firm desires men with experience and following among engineers and contractors. Territories open in New England, North Central, Midwest, West, Northwest. Give details as to experience, territory you can cover, industry references, other lines handled. Replies held in confidence. BOX A6627, Air Conditioning, Heating & Refrigeration News.

EXPERIENCED COUNTERMAN and buyer for the Midwest's leading wholesaler of refrigeration, air conditioning and heating supplies. Must be willing to locate in large southern city. Send a complete resume including buying and sales experience together with a snap shot and sample of handwriting to BOX A6630, Air Conditioning, Heating & Refrigeration News. All replies confidential.

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CLOSE OUT sale: Best known insulation press on cork base, flexible, adhesive strip. For covering refrigeration suction lines, copper pipes, water lines. Prevents condensation, dripping, sweating. ¼" thick x ¾" wide x 15' rolls. Carton of sixteen rolls $6.24. ¼" thick x 1½" wide x 15' rolls. Carton of twelve rolls $9.48. F.O.B. Chicago, Illinois check w/order or C.O.D. COLD-PARTS SUPPLY, INC., 1600 S. Dearborn Street. Chicago 16, Illinois.

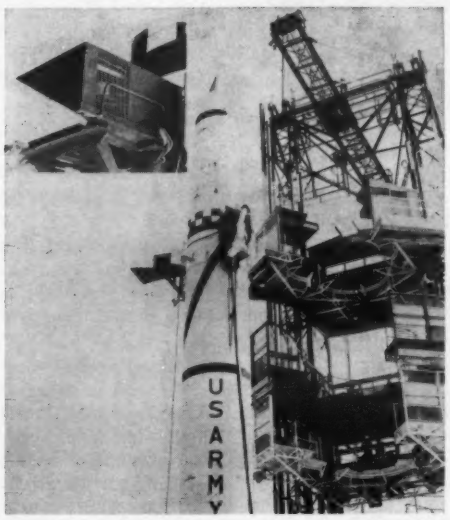
ATTENTION REFRIGERATION Servicemen. Send for catalog listing values in refrigeration and air conditioning parts, relays, capacitors, compressors. Savings up to 50%. WALTER W. STARR, 2833 Lincoln Ave., Chicago 13, Illinois.

BUSINESS OPPORTUNITIES

STOCKTON, CALIFORNIA — Established refrigeration and air conditioning—sales—service—installations. Since 1927. Show room & shop $16,500. Property included. Room to expand. Owner retiring. BOX A6626, Air Conditioning, Heating & Refrigeration News.

ESTABLISHED 20 years — Refrigeration and air conditioning contracting business in middle west. Exceptional opportunity to step into an owner-owned building of 3200 down, 2000 up square feet, including fully equipped shop, garage, office, display room, trucks. Well-established accounts of many years standing. Owner, though retiring, available to assist for months. BOX A6629, Air Conditioning, Heating & Refrigeration News.

Next Step—Air Condition the Monkey's Penthouse



LEFT: A one-ton room air conditioner on the upper left of this Redstone Missile at Cape Canaveral is used to control the temperature and humidity in the aft section which contains a TV camera. The camera is utilized to photograph the separation of the missile sections while in flight and it requires air conditioning to preserve the film and permit functioning of the camera. The Airtemp room unit (shown in the insert) is removed from the missile, with the gantry, 30 seconds before blast-off.

Mechanical Refrigeration Keeps Greenland Ground Frozen Under Heavy Radar Structure

THULE, Greenland — This may sound silly, but mechanical refrigeration is helping keep Greenland frozen.

At this northernmost outpost of the American early warning defense system, mechanical refrigeration is employed to keep the ground frozen under heavy radar structure that would otherwise sink into melting permafrost.

Air conditioning is also used to cool windowless buildings housing electronic and computer equipment, reports John G. Ames, senior engineer for Natkin & Co. of Houston, Texas, who has spent five months at Thule supervising the refrigeration equipment. Temperatures range from -40°F to 50°.

Power for the cooling system is supplied by a Navy ship anchored in a special basin 15 miles from the base, Ames said. But a permanent nuclear power plant will be built at the base.

We're Sorry

But the 1960 AIR CONDITIONING, HEATING & REFRIGERATION DIRECTORY has been sold out.

1961 issue will be published and available in December, 1960. Place your order now to insure prompt delivery. Price $1.00.

In the meantime if you need to know the answer to: Who makes what? Where can I buy? Or any other questions about industry products, manufacturers, wholesalers, associations, or exporters address your inquiry to the Directory Editor, 450 W. Fort St., Detroit 26, Mich. He'll do his best to provide you with a prompt answer.

Advertisers! Still time to place your advertisement in the 1961 EDITION. Closing Date: October 1, 1960. Write today for details.

AIR CONDITIONING, HEATING & REFRIGERATION DIRECTORY

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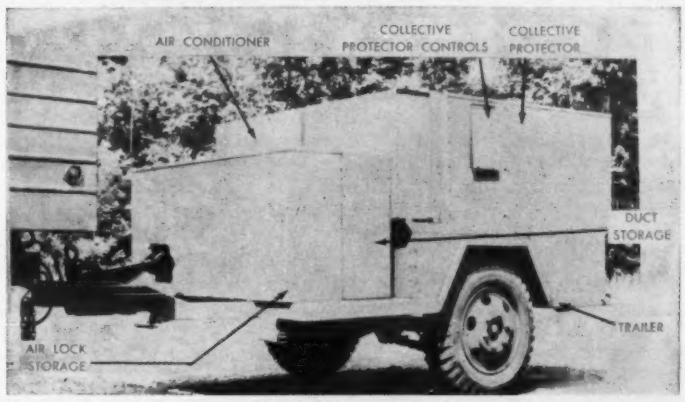
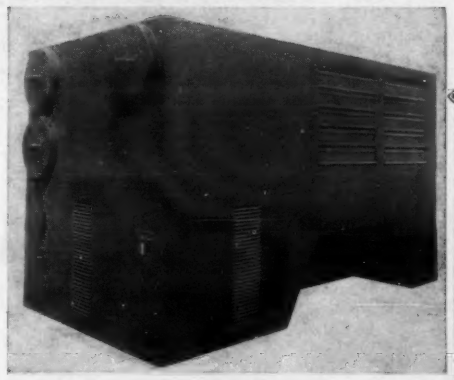
Trailer Air Conditioner Protects Nike Electronic Van from Radiation



ABOVE: View of trailer mounted air conditioner and air purification unit used to protect electronic equipment at Nike bases from radiation.



RIGHT: Opposite view of unit shows flexible duct connections through which purified air is fed to air conditioner, trailer, or both.

SILVER SPRING, Md.—The Army is protecting vital electronic equipment at Nike bases across the U.S.A. with trailer-mounted air conditioning units that will both remove radiation and cool the equipment-carrying vans even in ambient temperatures as hot as 125°F.

The two-wheeled trailer units, costing $5,000 apiece, are the development of Harvey W. Hottel, Inc. here. Hitched to any 2½-ton 6 by 6 truck, of which the Army has thousands, the trailer with its 3,000-lb load will go anywhere the truck can.

It will roll over unimproved roads at 50 mph and open terrain at 35 mph. When fording hard-bottom streams, the trailer can be completely submerged, though its load cannot.

"By distributing electronic equipment, radiation could knock out a Nike base as effectively as a direct hit with an atom bomb," A. Merrill Rouse, research and development director for Hottel, pointed out.

"We designed a unit that can be towed to any site quickly. The unit will decontaminate and cool the van air so that electronic instruments can continue to guide Nikes to their targets with protection to operating personnel," he explained.

The trailerized unit contains a 60,000 Btuh, 400-cycle air conditioner with dehumidification features, a set of flexible ducts for connecting the unit to the van, a collective protector for removing air contaminants, and an air lock to be installed on the rear of the Nike van.

The unit draws its power from the same generator that serves the Nike van. The air conditioner is wired for operation on 208-volt, 3-phase, 400-cycle, 4-wire power supply only.

When the flexible ducts are connected to the unit and to the conditioned space (it can cool other enclosures when not needed for the van), the air conditioner will supply cooled, filtered, and dehumidified air at the rate of 1,200 cfm against an external static pressure of 2.5 in. w.g.

The air conditioner is controlled by a three-position switch: off, fan, and coil. In the "fan" position, the evaporator blower is started and continues to operate until the switch is moved to another position.

In the "cool" position, all components are controlled by thermostat and humidistat. Evaporator fan operates continuously but compressor, condenser fan, and solenoid valves operate only on demand.

A hot gas reheat feature provides dehumidified air to the conditioned space after the thermostat is satisfied.

For the compressor, there are both high and low pressure cutouts. If the system loses its charge or suction pressure drops below the setting for any reason, compressor cuts off. Similarly an excess of pressure will stop the compressor.

When cooling load is light, condenser solenoid valve cuts off half the air-cooled condenser coil.

Compressor is an open-type 4-cylinder unit using Refrigerant-12. A 10.7-hp gear reduction motor and fluid coupling drive the compressor. Rubber mounts protect the compressor, motor, and coupling assembly from vibration during transit.

Gravity dampers protect fans from driving rain and weather and from damage in transit.

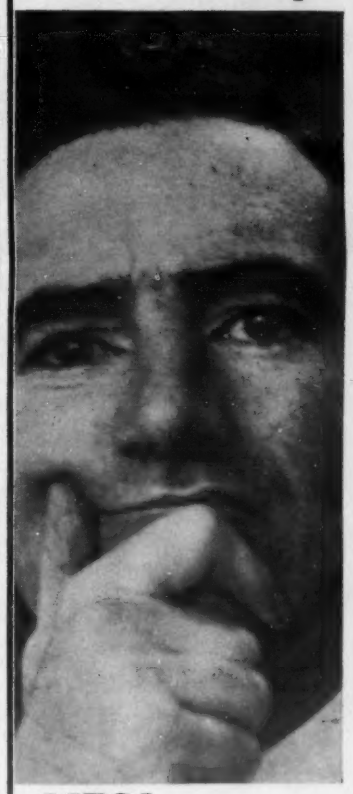
Evaporator coil is divided into six equal refrigerant circuits. All are used during cooling cycle. But only top circuits are flooded during reheat cycle.

The collective protector, a bed of activated carbon filters, is mounted alongside the air conditioner. Outside air is forced through the filters and then is used as either fresh air to the air conditioning unit or by duct as ventilation air to the Nike van.

It has its own blower, connected to the collective protector by a flexible connection. All the air that flows from the collective protector is at ambient temperature. The amount that is sent to the air conditioner can be varied by damper controls. A flow meter shows visually the amount going to conditioner or to van.

The air lock for installation on the rear of the Nike van prevents contaminated air from entering the van when personnel move in and out.

"ISN'T THERE A REALLY GOOD ICE MACHINE CLEANER?"



YES! By "really good" we mean, of course,—CSCO Ice Machine Cleaner! So effective . . . CSCO clearly removes deposits which cause cloudy, opaque ice, disagreeable odors and tastes. So speedy . . . CSCO cleans in minutes. So safe . . . CSCO will not harm operator or equipment. So economical . . . one bag of CSCO usually is sufficient to clean 2 small icemakers. Packed in ½ lb. polyethylene bags, 25 bags per carton. Insist on a quality Solvex product.

CHEMICAL SOLVENT CO.
BIRMINGHAM, ALABAMA

ASK YOUR WHOLESALER

Missile Cooling - -

(Continued from Page 1, Col. 5)

the limits imposed by security regulations and other restrictions) just where and how air conditioning plays its part in the U.S. missile program. In brief, this is its current role:

1. Air conditioning has a vital function in cooling the Titan and Atlas Intercontinental Ballistic Missiles (ICBM's) before, during, and after launch. These missiles constitute our principal deterrent force to a missile attack by an enemy.

Air conditioning also plays a vital role in various areas of the missile base, such as control centers, telemetry centers, checkout areas, and in the launching pads.

2. The underground launch complexes for the "hard" base sites which will serve as the operational missile deterrent striking force, and thus our main weapon against any possible enemy, require air conditioning throughout much of the underground facilities. The requirements for the "hard bases" are, in certain applications, something beyond those of the above-ground launching operations.

3. Air conditioning has applications in many of the ground-support and auxiliary equipment in the whole range of the missile program, such as in trailers carrying electronic systems, and in testing setups for components.

4. In manufacturing plants which produce the close-tolerance components for missiles, air conditioning creates the atmosphere in which such parts can be satisfactorily produced.

5. For nuclear, missile-firing submarines, air conditioning is an absolute must. Long trips submerged below polar ice caps or in tropical deeps call for systems that will cool, dehumidify, and purify air under almost any conditions. Another vital requirement: They must be vibrationless to prevent detection of the sub by enemy listening posts.

6. And air conditioning is helping to hold in government service in the missile program trained and competent personnel by providing comfortable living conditions in such areas where year-round air conditioning is necessary for comfort.

NEMA Estimates July Refrigerator Sales at 291,500

NEW YORK CITY—The National Electrical Manufacturers Association estimated that total industry sales of household refrigerators in July amounted to 291,500, compared to 370,800 a year earlier.

Farm and home freezer sales in July totaled 97,500, down from the 124,600 sold in the like month of 1959, according to NEMA.

For the first seven months of 1960, refrigerator sales totaled 2,069,200, against 2,237,100 in the corresponding period of 1959, and freezer sales aggregated 671,800, compared to 777,600, the NEMA report indicated.

County Clerk Incarcerated In Row over Who Is To Pay for Judge's Conditioner

KENOSHA, Wis. — An innocent little air conditioner got itself caught in a mass of legal red tape that, at press time, still hasn't been untangled.

While the air conditioner goes through its routine, though possibly illegal, activities of cooling County Judge Harold Bode's chamber, the judge himself was ordered to appear before the Wisconsin Supreme Court last Thursday.

He was directed to show cause why the supreme court should not take jurisdiction over the squabble between His Honor and County Clerk Richard Lindgren caused by acquisition of the air conditioner.

We say acquisition and not purchase, because the dealer who installed the $250 unit still hasn't been paid for it.

It seems that during the early September heat wave, Judge Bode got tired of waiting for Kenosha County to supply him with the air conditioner he had been requesting for nearly a year. He ordered one installed on a "temporary approval basis."

When he got the bill for the air conditioner, he forwarded it to Lindgren for payment. Lindgren refused to honor it.

Lindgren pointed out that the county board had not authorized payment and that bids were required on any purchase over $125.

Lindgren indicated that if the judge wanted the air conditioner, he would have to pay for it himself.

That communication only made the hot and uncomfortable Judge Bode even hotter under the collar. He ordered Lindgren to appear before him to show cause why he shouldn't be held in contempt of court.

Lindgren appeared. Judge Bode asked him to plead guilty or not guilty. Lindgren wanted to make a statement first. Judge Bode didn't want to hear the statement, he wanted a plea. Lindgren wouldn't give it. Nine times he refused to plead. Then Judge Bode ordered him jailed until he would.

Lindgren spent two hot nights in the cooler. In the meantime, Acting District Attorney Mrs. Vivian Newton got busy. She tried in vain to get a writ of habeas corpus from the three other county judges. But they wouldn't interfere. So she went to Racine County and got a writ which Sheriff Floyd Hughes honored. He sprung Lindgren.

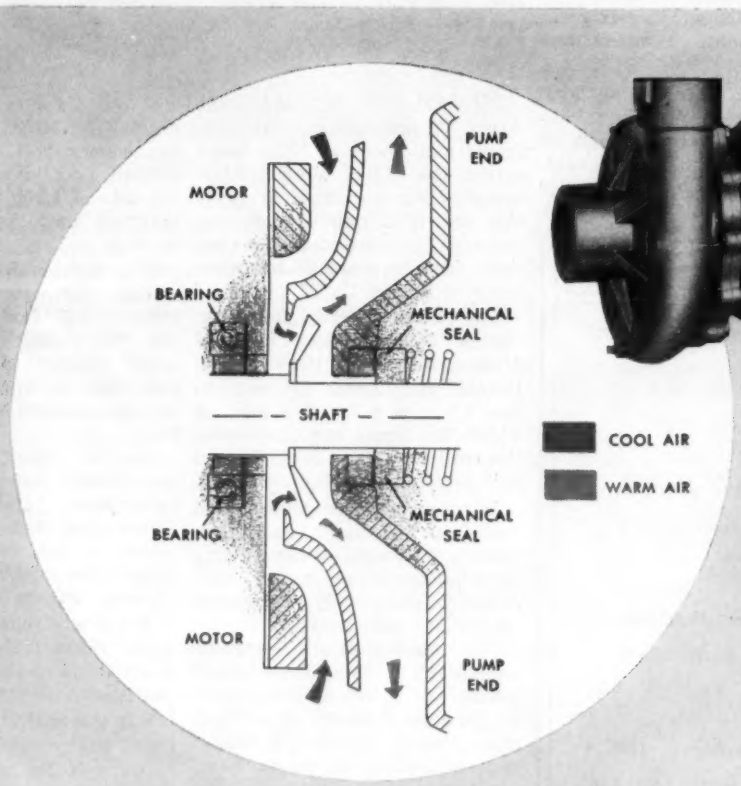
As soon as Judge Bode heard of this, he ordered Lindgren reincarcerated and the sheriff held in contempt of court!

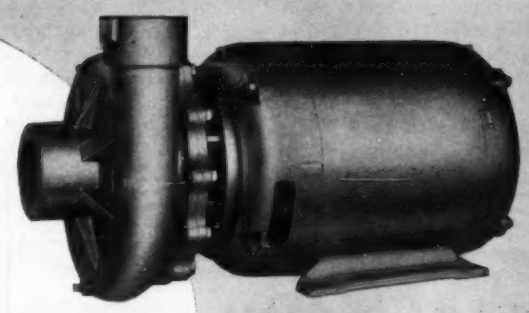
Faced with this dilemma, Mrs. Newton hastened to Madison, the state capital, and asked Gov. Gaylord Nelson to intervene.

Gov. Nelson instructed his attorney general to ask the state supreme court to exercise its supervisory jurisdiction over Judge Bode.

The court immediately ordered Lindgren released and ordered Judge Bode to cease interfering with the writ of habeas corpus. The court also hailed the judge before it to show cause why the supreme court should not take jurisdiction in the matter.

NEW DUNHAM-BUSH A9 CENTRIFUGAL PUMPS PROVIDE 2-WAY PROTECTION AT DANGER ZONE





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The new heavy duty, quality A9 pump expands the Dunham-Bush centrifugal pump line to 51 size standard models . . . 1750 or 3450 RPM, high capacity and head . . . plus non-standard pumps with special impellers.

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